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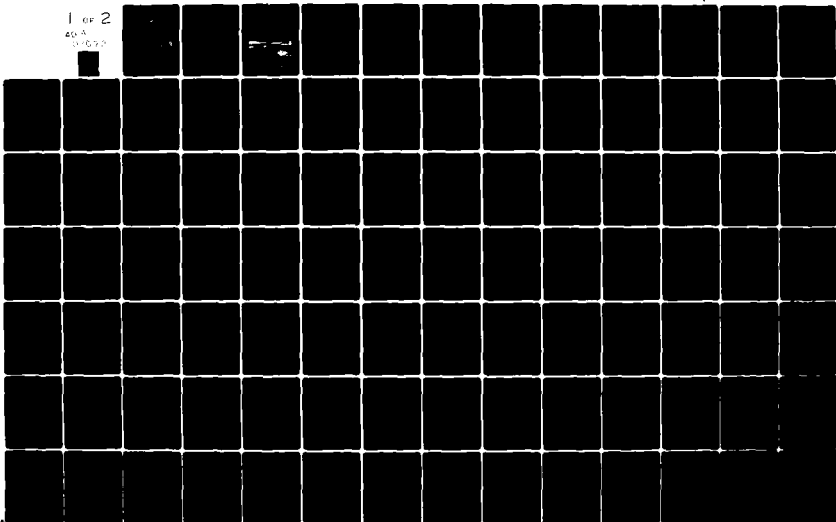
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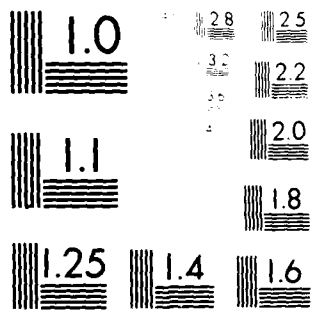
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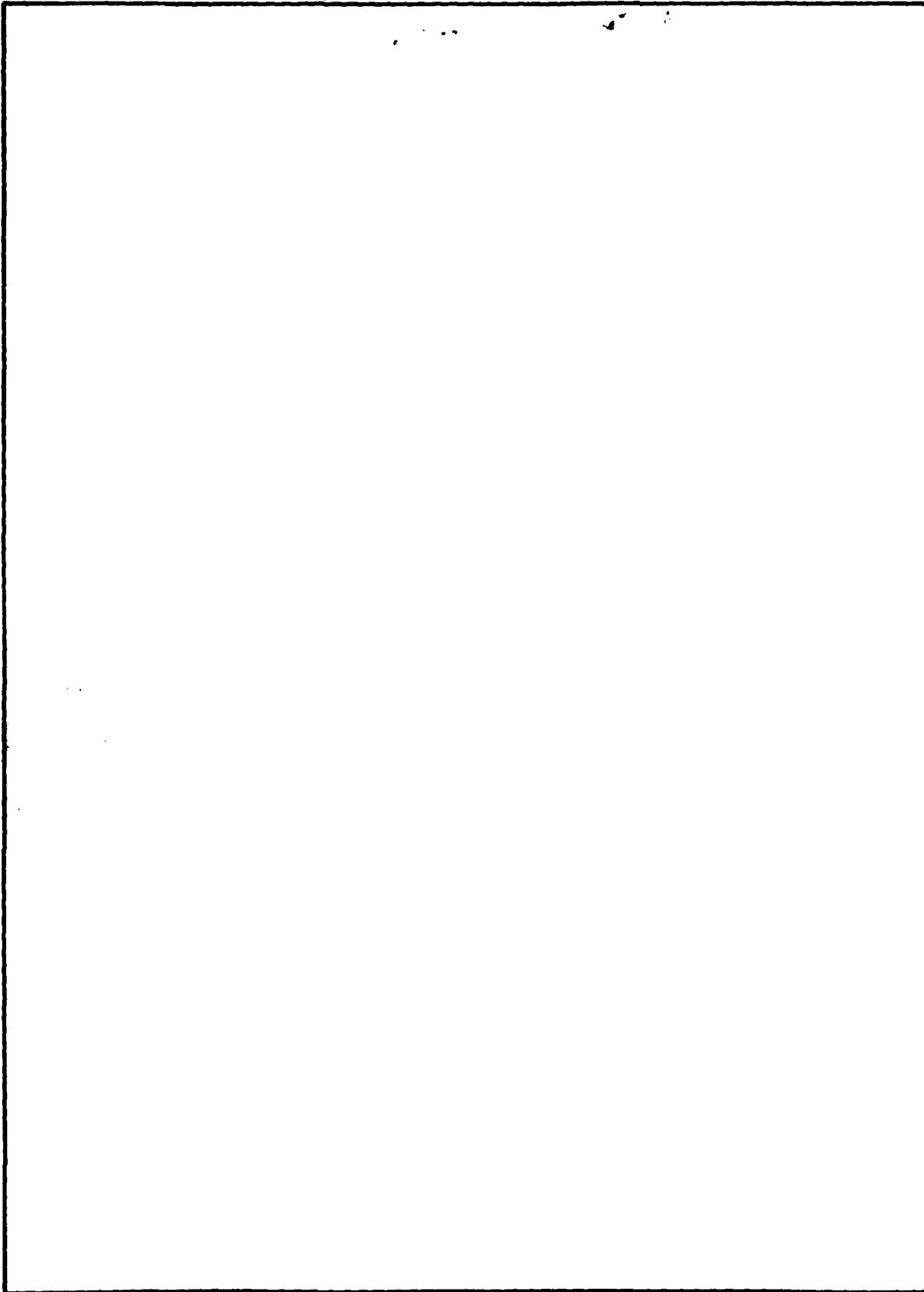
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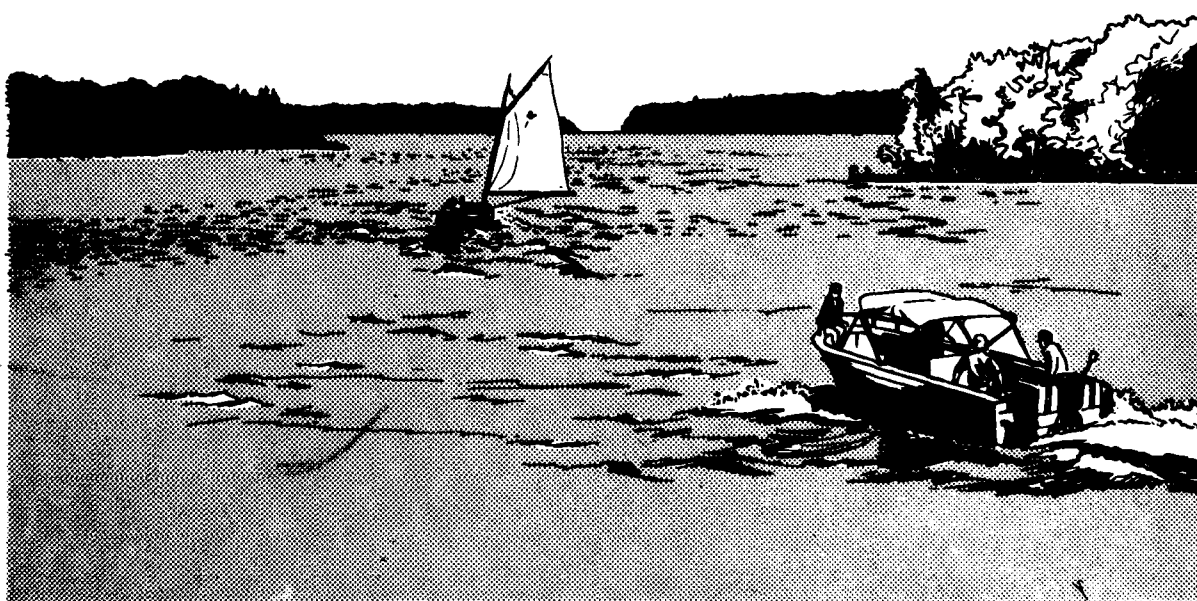
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FINAL ENVIRONMENTAL STATEMENT
Confined Disposal Facility and
Maintenance Dredging of the
Les Cheneaux Island
Federal Navigation Channels, Michigan



U. S. ARMY ENGINEER DISTRICT
DETROIT, MICHIGAN

JANUARY 1979

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SUMMARY

CONFINED DISPOSAL FACILITY AND
MAINTENANCE DREDGING OF
THE FEDERAL NAVIGATION CHANNELS
AT LES CHENEaux ISLANDS, MICHIGAN

() DRAFT

(X) FINAL ENVIRONMENTAL STATEMENT

RESPONSIBLE OFFICE: U.S. ARMY ENGINEER DISTRICT, DETROIT
Corps of Engineers
P.O. Box 1027
Detroit, Michigan 48231
Telephone (313) 226-6752

1. NAME OF ACTION: (X) ADMINISTRATIVE () LEGISLATIVE

2. DESCRIPTION OF ACTION: The proposed action is the construction of a confined disposal facility for contaminated dredged materials and maintenance dredging of the Les Cheneaux Island channels. The dredged materials disposal facility would be located inland, approximately two miles by road from the new Village of Cedarville Marina. The facility would have a capacity of 110,000 cubic yards. This would contain a ten year maintenance quantity of 40,000 cubic yards, plus 70,000 cubic yards of backlog. In addition, maintenance dredging would include another 18,000 cubic yards of bottom material suitable for open lake disposal. A total of 128,000 cubic yards would be dredged. The channels to be maintained are approximately 40,000 feet in length and have previously been deepened to 7 feet and widened to 100 feet with additional enlargement where required. Maintenance dredging is necessary for continued recreational use of the channels.

3. (A) ENVIRONMENTAL IMPACTS: The project would allow for continued use of the harbor by recreational boaters. It would also be of economic benefit to commerce in the area should increased use of the channel result. Short term positive economic

benefits to the area could also result from possible employment of area residents during construction activities. An indeterminate benefit to the aquatic environment would result from removal of contaminated sediments from the channels. Revegetation of the township dump (confined disposal site) after the ten year fill period would benefit the natural resources of the area. Sealing a portion of the Cedarville Township dump site would also offer some ground water protection.

(B) ADVERSE ENVIRONMENTAL EFFECTS: Adverse impacts due to construction of the disposal facility include temporary noise, road traffic, exhaust emissions, and dust. The isolation of the facility from developed areas would minimize most of these effects. Construction of the dredged materials confinement facility would destroy the existing upland vegetation in the immediate area. Adverse impacts from dredging activities include noise, exhaust emissions, visual impact, interference with recreational boating and temporary loss of aquatic habitat.

4. ALTERNATIVES. The following were considered as alternatives to maintenance dredging and disposal of the sediments for the selected site:

- a. No action
- b. Alternative diked disposal sites
- c. Pretreatment of dredged material for open water dumping.

5. COMMENTS REQUESTED FROM:

Advisory Council on Historic Preservation
U.S. Department of Commerce
U.S. Department of the Interior
U.S. Department of Agriculture
U.S. Department of Transportation
U.S. Environmental Protection Agency

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Table of Contents

<u>Section</u>	<u>Title</u>	<u>Page</u>
	SUMMARY	1
1.	PROJECT DESCRIPTION	1
	A. Purpose	1
	B. Project Dimensions	2
	C. Authorization	4
	D. Economics	6
2.	ENVIRONMENTAL SETTING OF THE PROJECT AREA	7
	A. General Introduction	7
	B. Geology	8
	C. Hydrology	10
	D. Water Supply	13
	E. Wastewater	13
	F. Harbor Sediment Quality	13
	G. Flood Hazard Area	14
	H. Climate	14
	I. Air Quality	15
	J. Vegetation	15
	K. Fauna	17
	L. Endangered and Threatened Species	20
	M. Cultural Elements, Aesthetics	22
3.	RELATIONSHIPS OF THE PROPOSED ACTION TO LAND USE PLANS	23

Table of Contents

(Cont'd)

4.	PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT	24
	A. General	24
	B. Wetlands	27
	C. Submerged Vegetation	27
	D. Water Quality	27
	E. Benthos, Including Shellfish	28
	F. Fishery Resources	29
	G. Wildlife	29
	H. Recreation	30
	I. Vectors	31
	J. Air Quality	31
	K. Socioeconomic Effects	31
	L. Flooding	33
	M. Commercial Fishing	33
	N. Endangered and Threatened Species	33
	O. Municipal Water Supplies	34
	P. Summary of Beneficial and Adverse Effects and Mitigation Measures	35
	Q. Relationship to Other Navigational Projects in the Vicinity	37
	R. Conclusions	37
5.	UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS	41

Table of Contents

(Cont'd)

6.	ALTERNATIVES TO THE PROPOSED ACTION	42
	A. Open Water Disposal	42
	B. Alternative Diked Disposal Sites	43
	C. Pretreatment	44
	D. No Action Alternative	44
7.	RELATIONSHIP BETWEEN SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY	45
8.	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES WHICH WOULD BE INVOLVED SHOULD THE PROPOSED ACTION BE IMPLEMENTED	45
9.	COORDINATION, COMMENT, AND RESPONSE	46
	A. Public Participation	46
	B. Government Agencies	47
	C. Comments and Responses	52
	REFERENCES CITED	69
	GLOSSARY	72
	PLATES	75

CONFINED DISPOSAL FACILITY AND MAINTENANCE
DREDGING FOR LES CHENEaux
ISLANDS, MICHIGAN

1. PROJECT DESCRIPTION

A. Purpose

1.01 The Les Cheneaux Islands constitute an extensive island group along the North shore of Lake Huron. The island group begins at Brulee Point, in the Michigan Upper Peninsula, and extends 15 miles eastward. The islands, their neighboring shoals, and the numerous points jutting among them from the irregular mainland coast, have a characteristic northwest-southeast geographical orientation. The channels between the islands provide shelter for cruising crafts during severe weather, as the islands are located between the straits of Mackinac and DeTour Passage. In addition, the channels serve as one of the most scenic recreational boating areas on the Great Lakes. The small boat course there has been improved to a depth of seven feet over a minimum width of 100 feet, with suitable widening at bends in the channel where required. No maintenance dredging has been performed since the completion of the initial work in the fall of 1970. Dredged material was then transported to deep water in Lake Huron and dumped.

1.02 In 1973 sediments to be dredged from the Les Cheneaux Island Channels were identified as unsuitable for open lake disposal by the Environmental Protection Agency (EPA). Resampling in 1976 by the EPA showed that a "substantial improvement in sediment quality" had occurred, resulting in a reclassification of the channel sediments. About 18,000 cubic yards or 14% of the total to be dredged is now classified as suitable for open water disposal. The results of the sediment evaluation and sample locations are shown in Appendix 1. It has been requested by the Governor of Michigan that contaminated dredge materials not be placed in open water. In compliance with this request a confined disposal facility would be constructed.

Section 123 of the River and Harbor Act of 1970 (Public Law 91-611) has authorized the construction, operation, and maintenance of diked disposal and storage areas for the containment of dredged materials for a period not to exceed ten years.

B. Project Dimensions

1.03 There are three distinct segments to the course (Plate 1). The middle entrance portion runs from near Peck Bay on Marquette Island to Muscallonge Bay and is 6,300 feet in length. The west entrance portion begins at a point west of St. Ledger Island in Hessel Bay and runs 16,000 feet southeast through Les Cheneaux Channel to Muscallonge Bay. The east entrance channel is a 17,400 foot V-shaped channel around the northern end of La Salle Island. Shoaling has occurred throughout the channels. The annual shoaling is estimated to be 4,000 cubic yards. In the channel area near Cedarville, accumulations are from 0.3 to 2.5 feet. By the time the confined disposal facility is ready for use, it is anticipated that a backlog of approximately 70,000 cubic yards would have accumulated in the channels.

1.04 The dredging would be performed by a contractor using a bucket dredge. The bottom material would be loaded into scows and towed to a land transfer site by tug or work boat. The transfer site would be located in Cedarville, at the site of the existing boat launch facility. A land based crane equipped with a clam shell would unload the scows into waiting trucks. The dredgings would be hauled to the upland disposal site.

1.05 The bottom material to be removed is anticipated to be similar to that removed by prior dredging operations. Bottom deposits can be described as organic silts, sandy clay, and silty sands. These deposits contain some organic material. The shoals are believed to originate from the shallower natural lake bottom on each side of the previously dredged channels. Movement of the material is caused by wave action or propeller wash and, to some degree, by ice action. A detailed description of the bottom material is shown in Appendix 1.

1.06 The proposed disposal area is located inland, approximately two miles by road from the new Village of Cedarville Marina, on a 40 acre tract of land currently being used as the Clark Township Landfill. Dredged materials will be trucked to the site from the Cedarville Marina boat launching ramp east of Meridian Road, south of Hodeck Street. The dredged material would be loaded directly into trucks for transport to the permanent disposal area. It is anticipated that trucking routes will be north on Meridian Road to State Avenue, then west to the entrance road to the Township Landfill site. Fill material will be placed at the disposal site over and south of the existing landfill mound, in depths ranging from one to approximately 20 feet, with fill progressing upward from south to north in relatively uniform lifts (See Plate VIII). Shoaled material classified as suitable for open lake disposal would be placed in a .5 mile square area located .5 mile SSE (160°) from the Penny Island Light buoy in Lake Huron (Plate I).

1.07 Improvements required in the boat launch facility area include the dredging of an access and maneuvering area 7 feet deep to permit scows to be brought to the mooring facility. Approximately 170 linear feet of steel sheet pile (SSP) cell wall would be added along the east face of the boat launch (See Plates II and III). This would enable a crane to sit on top of the SSP cells and transfer the dredged material from moored scows to trucks for hauling to the Township landfill. The SSP cells would be approximately 20 feet in diameter and placed at the outside toe of the existing stone rip-rap. The cells would rest on the dolomite rock lake bottom. The interior of the SSP cells would be filled with rock. Granular fill would be placed between the cells and the existing stone rip-rap. Trucks would park on a new pavement surface that would be added between the existing pavement and the SSP cells. Should the dredged material be unduly wet or sloppy, specially lined, gasketed, or otherwise compartmented trucks may be required, to prevent spillage of the material along the haul route.

1.08 Modifications required at the disposal area include the clearing of approximately five and one-half acres of trees south of the existing cleared area, the grubbing of stumps and brush from the cleared area and from approximately one and one-half acres in the existing cleared area, and the construction of a diked enclosure area to contain the dredged material. The diked enclosure area will be entirely sealed on the bottom with an approximately 24" thick layer of clay to prevent potential contamination of ground water supplies by percolation of contaminated water or solids through fissures in the existing rock underlying the area. Dikes will have a 10 foot wide top with side slopes of 2 horizontal to 1 vertical and will be constructed of graded granular fill. The floor of the enclosure is sealed with an in-situ 24 inch thick layer of clay.

Diversion ditches will be constructed as required to prevent storm runoff from adjacent areas from reaching the containment facility. Out-flow from dewatering of the material and of runoff from rainfall will be discharged overland through an outlet structure with weir and skimmer to control discharge. Grading of the containment facility will be performed so as to form a sedimentation basin area until such time as a final cover of vegetation is established.

1.09 The confinement facility will have a capacity of 110,000 cubic yards. This will consist of a ten year maintenance quantity of 40,000 cubic yards, in addition to 70,000 cubic yards of backlog. It is anticipated that it will take four months to remove the accumulated backlog. The annual shoaling, estimated to be 4,000 cubic yards, will be removed as required. This is expected to be once every five years.

C. Authorization

1.10 The initial dredging was authorized by Section 107 of the River and Harbor Act of 1960. The authority for the construction of a contained disposal facility is Section 123 of the River and Harbor Act

of 1970 (Public Law 91-611). This authorizes the Secretary of the Army, acting through the Chief of Engineers, to construct, operate, and maintain, (subject to the provisions stated below) contained disposal facilities with the concurrence of appropriate local governments.

1.11 Public Law 91-611 states that prior to construction of any such facility, the appropriate State or States, interstate agency, municipality, or other appropriate political subdivision of the State, shall agree in writing to: (1) furnish all lands, easements, and rights-of-way necessary for the construction, operation, and maintenance of the facility; (2) hold and save the United States free from damages due to construction, operation, and maintenance of the facility except for negligence; and (3) maintain the facility after completion of its use for disposal purposes in a manner satisfactory to the Secretary of the Army.

1.12 The appropriate non-Federal interest or interests agree to contribute 25 percent of the construction costs unless it is waived by the Secretary of the Army upon a finding by the Administrator of the Environmental Protection Agency that the area to which such contribution applies is meeting applicable water quality requirements and standards. The local costs of the construction were waived by the District Engineer, Detroit District Corps of Engineers, by letter dated 24 December 1976. Therefore, all construction costs of the project will be assumed by the Federal Government.

1.13 The participating non-Federal interests retain title to all lands, easements, and rights-of-way furnished and may transfer title to it only after completion of the facility's use for disposal purposes and after satisfactory maintenance is assured.

1.14 Maintenance dredging projects are reviewed and evaluated under the following laws: Federal Water Pollution Control Act of 1972, the National Environmental Policy Act of 1969, the Fish and Wildlife Act of 1956, the Fish and Wildlife Coordination Act of 1958, the Marine

Protection Research and Sactuaries Act of 1972, the National Historic Preservation Act of 1966, the Endangered Species Act of 1973, as well as the various Congressional Acts authorizing construction and maintenance of the Federal project.

D. Economics

1.15 Strict regard for benefit/cost ratios is not required since Congress has directed the Secretary of the Army, under authority of the River and Harbor Act of 1970, P.L. 91-611, Section 123, to contain dredge material. This containment of material is considered a temporary measure to relieve unacceptable stress upon the water bodies subject to open lake disposal, rather than a permanent solution to the disposal problem. However, economic considerations are an important consideration in selection of a preferred site under Public Law 91-611.

1.16 The 1976 updated sediment data indicated that portions of the channel bottom sediments are considered suitable for open water disposal. Such materials will be disposed of in the open lake unless a more suitable means of disposal is made available, such as beach nourishment or highway construction. Under current laws additional costs of such a disposal method, if any, would have to be borne by a local sponsor.

1.17 The total Federal costs for the existing project as of 30 September 1978 are as follows:

	<u>EXISTING PROJECT</u>	<u>PREVIOUS PROJECT</u>
New Work	\$ 198,310*	\$ 0
Maintenance	129,551	0
	<hr/>	<hr/>
TOTAL COSTS	\$ 327,861	\$ 0

*Excludes \$130,866 Contributed Funds.

Summary of the proposed project costs, both Federal and non-Federal, and expected annual costs can be found in Appendix 6.

2. ENVIRONMENTAL SETTING OF THE PROJECT AREA

A. General Introduction

2.01 The Les Cheneaux Islands are located along the north shore of Lake Huron on the southern coast of Michigan's Upper Peninsula. The islands lie offshore from the Village of Cedarville in Mackinac County, 22 miles northeast of the Mackinac Straits, 22 miles west of the eastern tip of the Upper Peninsula at Detour, and 32 miles south of Sault Ste. Marie (14) (Plate 1).

2.02 The Small Boat Course through the islands consists of an east entrance, a middle entrance, and a west entrance. The east entrance extends from Penny Island up through Scammons Harbor and into Cedarville Bay along LaSalle Island, proceeds around the northern end of the island, and then heads south towards Little LaSalle Island. The middle entrance lies between Little LaSalle Island and Marquette Island and extends up into Muscallonge Bay where it forks off to the east and west. The west entrance proceeds northwest from Muscallonge Bay through Les Cheneaux Channel then towards Hessel then heads south towards the west entrance along Marquette Island. This channel is to be a minimum depth of seven feet over a minimum width of 100 feet, with suitable widening where required at bends in the channel. The River and Harbor Act of 1960 authorized the dredging at Small Boat Course which the Corps of Engineers completed in the Les Cheneaux Islands in September of 1970 (2, 9, 17).

2.03 Maintenance dredging of the Small Boat Course requires the construction of a confined disposal facility to handle the maintenance dredging materials that the Environmental Protection Agency has classified as unsuitable for open lake disposal. Confinement of the sediments

is at the request of the Governor of Michigan and is authorized by the River and Harbor Act of 1970 (P.L. 91-611). A diked facility, with capacity of ten years or less, will be constructed to contain the annual shoaling (4,000 cubic yards per year) of approximately 110,000 cubic yards, including a backlog of 70,000 cubic yards of sediment. The Les Cheneaux Channel sediments were investigated by the Environmental Protection Agency during surveys conducted in 1970, 1973 and 1976. Results from the 1973 and 1976 surveys are compiled in Appendix 1. Based on results from the 1973 survey, the Environmental Protection Agency classified the sediments as contaminated in one or more of the parameters listed in their criteria. In a 1976 survey, bottom sediments were classified as uncontaminated or a combination of uncontaminated and moderately contaminated. As a result of the reclassification based on the 1976 data, portions of the proposed dredgings may be disposed by open lake disposal methods. The remaining sediments are not suitable for open lake disposal and would be disposed of on land at a confined disposal site.

B. Geology

2.04 The geologic features of the Les Cheneaux-Cedarville area consist of unconsolidated glacial material overlying the dolomite bedrock referred to as the Engadine Dolomite. The drift mantle is generally thin and, in places, discontinuous. Glacial formations known as drumlins or streamlined drift deposits are found throughout the area. These ridge-like hills are composed of gravels and sands overlying clays. The broad flat areas between the ridges consist of lake deposited sands overlying clays. The numerous islands making up the Les Cheneaux group are classified as drumlins geologically. These cigar shaped formations consist of unconsolidated drift material that was deposited and then reworked by ice moving over these deposits (1,22).

2.05 Underlying the thin deposits of glacial material is a bedrock surface with the formation name of Engadine Dolomite. The bedrock surface lies from just a few feet beneath the surface to several tens of feet beneath the land surface. Immediately in the Cedarville area, the bedrock surface is encountered at from 5 to 25 feet below the land surface. The Engadine Dolomite is 100 to 175 feet thick consisting of a hard, resistant, white, commonly crystalline dolomite, interbedded with sands and cherty limestone. The upper surface is weathered and has many solution cavities (3,20,22).

2.06 The elevation of the land surface is generally between 600 and 650 feet above mean sea level. Several of the hills in the vicinity rise 40 to 70 feet above this level to a maximum of 740 feet above mean sea level. The lowest elevations are adjacent to the lake at an elevation of approximately 580 feet above mean sea level. The unique geological feature of the area is the group of elongated hills or drumlins which extends out into the lake and makes up the Les Cheneaux Islands group. In addition, there are numerous submerged drumlins which have been mapped just offshore in Lake Huron.

2.07 The soils in a large portion of the eastern part of the Upper Peninsula can be considered as one broad soil group and a natural land type on the basis of the limey nature of the glacial outwash, stoniness, shallow depth bedrock, low relief of the terrain, and relative uniformity in climate (5).

2.08 Two types of soil are found in the area. A Longrie-Gilchrist-Onway Association Soil is characterized by a very thin soil mantle over bedrock and frequent outcrops, or by a thicker cover of loose, dry, sands over stoney clay drift. The surface is nearly flat, though interrupted by low mounds, hillocks, ridges and low escarpments or, at the other extreme, rolling table land with both shallow and deep swales and smooth rounded hills and ridges. Stoniness is a characteristic feature, from cobbles and small slab fragments to hugh pro-

truding blocks of limestone. These soil types embrace the drier, or well drained, land. The second group found in the area has a high proportion of wet and swampy land along with the other conditions - shallow bedrock outcrops; low swells of stoney, clayey, drift; beach ridges of gravel and cobbles; stratified sands; and other features resulting from the reworking of drift by glacial lake waters. These soils provide a very thin cover of stoney clay over the bedrock; stone-free plastic clay, silts, and very fine sands; and occasionally, small to large areas of dark, shallow mucks in quite irregular arrangements with higher land. The soils of this group include Detour-Longrie-Onaway-Johnswood types (5).

2.09 The slope of the land surface averages from 2% to 12% generally with few areas exceeding the 12% slope. Most of the soils are covered with vegetation, primarily forest of second growth timber. The low slopes and the extensive vegetation cover reduce the potential for erosion of the surface in the Les Cheneaux area (2).

C. Hydrology

2.10 Lake Huron - The level of Lake Huron fluctuates from year to year and also from month to month during each year, depending upon the volume of water in the lake. In addition, the stage at a specific place on the lake may vary from day to day and even from hour to hour due to unbalance or tilting of the lake surface resulting from several causes, chiefly wind and differential barometric pressures. The annual and seasonal fluctuations amount to several feet, and the daily and hourly stage variations range from a few inches to many feet.

2.11 The usual pattern of seasonal variations of levels of Lake Huron shows high levels in the summer and early fall and low levels in late winter. The highest lake level is usually reached in July. The lowest level recorded for Lake Huron was 575.35 feet above International Great Lakes Datum in March 1964. The high level of 581.04 feet was recorded in July 1974. Mean lake levels have declined since 1974

with the most pronounced differences occurring between mid-1976 and mid-1977 (May) when lake levels fell 1.8 feet. Lake levels fell below average levels in June 1977 - an event which had not occurred during the five previous years (23).

2.12 Streams - Drainage of the Cedarville-Les Cheneaux area is by a number of small streams which flow directly into Lake Huron. Three creeks enter the bay or embayments and add a minor sediment load in the proposed project area. These include Mackinac Creek to the west, Pearson Creek in the center, and Flowers Creek to the east. The drainage basins for these creeks are limited to just a few square miles with the headwaters originating approximately three to five miles inland from the bays associated with Lake Huron.

2.13 The small size of the drainage basins and the minimal amount of flow originating from them do not add such large quantities of water to the bays as to create an outward flow toward Lake Huron. The currents in the embayments adjacent to the Les Cheneaux Islands and Cedarville are predominantly wind generated and there are associated littoral drift currents. The minimal flow in the bay is responsible for the fine nature of the bottom sediments that are found in the proposed project area. These bottom sediments are classified as predominantly organic; however, some fine silts and clays are present.

2.14 No water quality data is available for the surface waters of the Les Cheneaux area.

2.15 Ground Water - Ground water in the Cedarville-Hessel area is obtained from both the unconsolidated glacial drift materials and the consolidated rock materials of the dolomite and limestone formations. Most wells in the area produce their supplies of water from the Engadine Dolomite, which forms the bedrock's surface. Wells tap weathered zones near the bedrock surface where some wells are completed in the morainal or outwashed deposits that mantle the rocks

in the northern part of the area, and others are completed in the shallower drift deposits at Hessel and Cedarville. Most wells of the Hessel-Cedarville area are less than 100 feet deep, although many are as much as 200 feet deep and a few exceed that depth. The Les Cheneaux Island group south of Cedarville consists of glacial drumlins which are partly submerged by Lake Huron. The glacial drift is thicker and its water-bearing properties have not been determined. Well logs from the area indicate that the shallow bedrock wells tend to be flowing wells or artesian type wells. The ground water in the vicinity of Cedarville is reportedly contaminated as evidenced by high levels of chlorides up to 400 mg/l and high levels of iron up to 12 mg/l. The poor quality of the waters are in part based on the geology of the area. The thin mantle of unconsolidated material overlying the creviced and fractured bedrock does not provide sufficient protection to eliminate sources of pollution from recharging the aquifer. Sources of pollution include salts from road salting operations, nutrients from partially treated wastewaters emanating from septic tanks and drains of residential and commercial establishments, and landfills or dumps that lie on top of the creviced and fractured bedrock (22).

2.16 In the management of the water resources of the Cedarville-Les Cheneaux Channel area, it should be realized that there is no continuous natural protection of the ground water that would tend to prevent surface contamination. Surface and ground waters in the area are one continuous water body. However, locations near the shores of lakes are very likely to lie over natural ground water discharge zones. Such zones offer ground water protection in resisting the penetration of the water table by downward percolating water. The upland areas are considered to be recharge areas except in the immediate vicinity of discharging streams.

2.17 The utilization of ground water in the Cedarville area has been limited, for the most part, to domestic and commercial supplies. No villages or towns have municipal supplies. Residents of Cedarville maintain privately owned wells for water supplies.

D. Water Supply

2.18 In an attempt to overcome the problems with ground water, some people in the Cedarville area are reportedly tapping into Cedarville Bay for their water. This action is unwise because of the possibility of bacterial contamination.

E. Wastewater

2.19 The Village of Cedarville maintains municipal wastewater treatment facilities approximately one mile north of the proposed disposal site. This facility discharges treated wastewater via irrigation on to the land surface and then into the ground waters of the area. The water upon entering the ground water regime, tends to flow southerly towards Pearson Creek which may be a discharge line for ground water. No other treatment facilities are known to exist within the study area.

F. Harbor Sediment Quality

2.20 Information on the bottom sediments of the Les Cheneaux Island Channels was obtained in 1973 and 1976. Sampling in 1973 revealed the sediments in the proposed dredge area to be predominantly gray to grayish brown ooze containing up to 95% ooze with minor amounts of sand, clay, pebbles and weeds. The 1973 Environmental Protection Agency analysis indicated that total volatile solids, COD, phenol, total Kjeldahl nitrogen, and oil and grease exceeded the recommended maximums as defined by the Environmental Protection Agency. Based on this analysis, the sediments were classified as not suitable for open lake disposal. Heavy metal concentrations were within acceptable limits set by the Environmental Protection Agency. The primary source for these contaminated sediments may have come from untreated waste originating from the Village of Cedarville and its environs. The new treatment facility north of town should eliminate this source of material from the harbor area. Resampling in 1976 showed an im-

provement in the quality of sediment to be found in the project area (refer to Appendix 1, page 1-9). Based on updated standards (1-20 and 1-21), EPA reclassified the major portion of the project (70,000 cubic yards) as suitable for restrictive open lake disposal and the remaining portion as suitable for unrestrictive open lake disposal (page 1-9).

G. Flood Hazard Area

2.21 The 100-year flood level for Lake Huron at the Les Cheneaux Islands is 582.3 IGLD. Fluctuations in the level of Lake Huron would be the controlling factor in determining the water level for the discharge of Pearson Creek at Cedarville. The top elevation of the lowest portion of dike (south side) at the disposal site would be 617.0 IGLD, well above any projected flood levels.

H. Climate

2.22 The influence from the three Great Lakes - Michigan, Huron and Superior - modifies the climate of the Cedarville-Les Cheneaux area throughout most of the year. Winds from a northerly direction bring Cedarville's only weather which has not been modified by the Great Lakes.

2.23 Weather changes are frequent because many pressure systems pass eastward through this section of the United States and Canada. Precipitation is well distributed throughout each year. Summer rains usually accompany a southeast surface wind; winter snows are most often associated with northwest winds. The closest temperature data available for the area is from Mackinaw City 22 miles west, and indicated the following extremes: a high of 104°F on July 29, 1916 and a low of -31°F on February 8, 1934; the warmest monthly mean temperature of 75.4°F was recorded in July 1955 while the coldest was in February 1904 with 2.4°F. Summers are dominated by moderately warm temperatures with an average of two days exceeding the 90°F mark. Temperatures have not reached the 100°F mark since July 1916.

2.24 Precipitation is well distributed throughout the year with the summer season, May through October, receiving an average of 17.57 inches or 61% of the average annual total. September, with 3.81 inches, is the wettest month, while February, with a 1.35-inch average, is the driest month. Summer precipitation is mainly in the form of afternoon showers and thunderstorms. Annually, thunderstorms will occur on an average of 24 days. Seasonal snowfall averages 73.6 inches at Mackinaw City with the average date for the first inch of snow accumulation to be November 20. Normally the snow cover would last through the winter to finally disappear about April 9.

2.25 The average date of the last freezing temperatures in the spring is May 15, while the average date of first freezing temperatures in the fall is October 15. The frost-free period or growing season averages about 153 days.

I. Air Quality

2.26 The Upper Michigan Air Quality Control Region consists of the northernmost 33 counties in Michigan. Some type of air quality monitoring is conducted in 11 counties. The nearest county that is monitored in the vicinity of the study area is Chippewa County. The monitors in this county continued to show stable suspended particulate levels well below primary and secondary standards. It is expected that these same levels would be reported for Mackinac County if monitoring were conducted in this area. The maximum highest 24 hour value of 103 micrograms per cubic meter (mg/m^3) is about two thirds of the secondary standard of $150 \text{ mg}/\text{m}^3$. This entire area of the Upper Peninsula is classified as having unpolluted air.

J. Vegetation

2.27 The dominant upland vegetation of the area is boreal coniferous forest. The boreal forest on dry-mesic and mesic, well-drained sandy

upland sites include white spruce, black spruce, and balsam fir with scattered fire-origin white birch and trembling aspen stands. The lowland coniferous forest on peat, muck, or other poorly-drained soils is characterized by black spruce, northern white cedar, tamarack, red maple, and balsam fir. Dry, upland sandy soil sites have mixed stands of white pine, red pine, white birch, and aspen, with an understory of balsam fir, black spruce, red maple, and white spruce.

2.28 Lesser amounts of second-growth mixed conifer-hardwood forest occurs on the loam soils of the uplands. The dominant forest species of these mixed conifer-hardwood stands include sugar maple, yellow birch, basswood, and black cherry, with scattered hemlock, white pine, and white spruce. The understory contains balsam fir, ironwood, and elm, and on fire-disturbed sites, white birch and trembling aspen.

2.29 Field observations were made on the vegetation and fauna of the Les Cheneaux Islands project area June 27-29, 1977.

2.30 Cedarville Harbor - Narrow-leaved emergent herbaceous vegetation dominates the shallow nearshore marshes with hardstem bulrush the major species. Cat-tail and softstem bulrush occur admixed. This vegetation type occupies shore areas of sand, gravel, or muck in water depths varying from wet soil to 20 inches.

2.31 Adjacent lakeward or in deeper nearshore water occurs another wetland vegetation type dominated by floating, broad-leaved emergents. Yellow water lily is conspicuous in this type with scattered bulrushes. Substrates vary from silty sand to muck, and water depths vary from 18 to 60 inches.

2.32 The Clark Township Harbor Improvement Project, which was completed in 1978, includes a boat launching ramp on Meridian Road with an adjacent daytime parking lot and a small docking facility. The project is owned by the Michigan Department of Natural Resources, Waterways

Division. In conjunction with these facilities there is an access channel that is maintained from the Federal project to the launching ramp by the State of Michigan.

2.33 Marshes in the area, dominated by hardstem bulrush, occur widely in the Les Cheneaux Islands. Mismar Bay, Hessel Bay, Flower Bay, McKay Bay, and Bush Bay contain good examples. This region (the Les Cheneaux Islands and adjacent coastal Mackinac County) is designated an "Area of Particular Concern" by the Eastern Upper Peninsula Regional Planning and Development Commission. These extensive marshes are major bird nesting and migration areas (see para 2.40 Birds).

2.34 Clark Township Dump (Site 1) - Coniferous forest and mixed conifer - broad-leaved forest occupy this 40-acre tract of land, with the exception of the approximately 10-acre dump proper and the access road. Adjacent Upland Conifer Forest occurs to the north.

2.35 The major forest trees on the proposed harbor dredging disposal site are: White spruce, balsam fir, black spruce, and white birch. Conspicuous shrubs included buffalo-berry, alternate-leaved dogwood, and bush honeysuckle.

2.36 Herbaceous species on the forest floor are characterized by large-leaf aster, shinleaf, sweet coltsfoot, and bunchberry; all species are common in northern lowland coniferous forests. The ground stratum is a species poor "feather moss forest", in which mosses Rhytidiadelphus triquetrus and Hylocomium splendens, and the lichens of the genus Peltigera are common.

2.37 The dump proper has received unconfined harbor dredging materials (clay and ooze) from the Clark Township Harbor Improvement Project. These sediments are currently being used as landfill cover.

K. Fauna

2.38 Historical logging practices, including clear-cutting, increased the acreage of open areas with their successional plant communities. These openings were first revegetated by shrub species such as juneberry, followed by fire intolerant species like aspen, jack pine, and scrub oak. Subsequently repeated fires combined with aspen and jack pine pulping, kept the forests in continual flux and provided a diverse cover and food for wildlife, particularly white-tailed deer and ruffed grouse (26). In recent years, forest fires have been controlled, open areas have been reforested, and forest types have been changed through longer rotation silvicultural practice, converting the early successional forest vegetation to mature forest, which provides little food for deer and grouse. This process leads to declining populations of deer, grouse, and other forest game. A list of common wildlife of the area, as well as the status of these species, is presented in Table K-1, Appendix 2.

2.39 Terrestrial (and Semi-Aquatic) Mammals - Extensive muskrat habitat exists to the southeast of Site 2 but out of the nearshore area involved in the access channel dredging operation. Muskrats were observed along the southeast Cedarville Harbor shoreline and in similar wetland vegetation in Flower Bay and Mismar Bay in the Les Cheneaux Islands region. The little brown bat was observed at dusk feeding over water.

2.40 Waterfowl, Shorebirds, and Marshland Species- Birds common to the wetlands of the Les Cheneaux Islands include waterfowl (diving and dabbling ducks), shorebirds (sandpipers, herons, killdeer, and plovers), and marshland species (wrens, thrushes, flycatchers, blackbirds, and sparrow). In addition, swallows feeding over water were abundant. Sixty-three (63) species of birds are reported for the nearshore and shoreline wetlands of the Les Cheneaux Islands, Mackinac County, including 40 reported as nesting in these habitats. The bald eagle, osprey and double-crested cormorant are "threatened" species using the area as a roosting-feeding grounds during spring and fall

migration. "Rare" and scarce (this last category has no legal status under the Michigan Endangered Species Act of 1974, P.L. 93-205) birds using the islands wetlands are the common loon, black-crowned night heron, and american bittern. The sandhill crane uses area wetlands during migration for roosting and feeding. None of the threatened or rare species were observed in the Cedarville Harbor proper, although these birds are reported frequently in the Les Cheneaux Islands from Mismar Bay on the west to Dudley Bay on the east. A "Checklist of Birds in the Nearshore and Shoreline Wetlands of the Les Cheneaux Islands, Mackinac County, Michigan" is included in Appendix 2.

2.41 The shoreline marshes of the Les Cheneaux Islands are a significant fall migration feeding and resting area for various ducks and geese (26). Canada geese and snow geese utilize the area during their north-south fall migration, while ducks use these wetlands primarily for west-east flight movements. Nine species of ducks are commonly seen including: black duck, bluewinged teal, ring-necked duck, lesser scaup, old squaw, bufflehead, common goldeneye, hooded merganser, red-breasted merganser, and common merganser.

2.42 Fish - The larger aquatic plants afford potential spawning grounds, nursery areas, and feeding habitat for species of fish found in the nearshore wetlands along the southeast shore of Cedarville Harbor. Local fishermen report the following species in the Cedarville Harbor area:

- northern pike
- largemouth bass
- smallmouth bass
- rock bass
- bluegill
- pumpkinseed

All of these species use shallow and deep marsh aquatic vegetation as feeding gounds and nursery areas.

2.43 Large invertebrates included in the moderately contaminated sediments from Cedarville Harbor were: aquatic sow bugs, scuds, aquatic earthworms, and the larvae of caddis flies, alderflies, and mayflies. In addition, a single bivalve mollusk was identified. Twenty-eight (28) taxa and 150 organisms were found in the gray-black mud and silt sediments of the Cedarville Harbor sample. Field and laboratory observations for eight Les Cheneaux Island bottom sediment samples are included in Table 1, Appendix 1, and in Appendix 2 (27). The open water disposal site would be inspected by divers prior to its use.

2.44 Terrestrial Mammals of Site 1, Clark Township Dump - snow-shoe hare and white-tailed deer signs (browsed twigs and scats) were observed in the forest surrounding the dump. The shorttailed shrew was seen in the brushy clearing below the active dump area, while raccoon, skunk and porcupine are reported by local residents of the area.

L. Endangered and Threatened Species

2.45 The peregrine falcon (Falco peregrinus), the eastern timber wolf (Canus lupus lycaon), the longjaw cisco (Coregonus alpenae), the Indiana bat (Myotis sodalis), and the Kirtland's warbler (Dendroica kirtlandii) are species on the official U. S. List of Endangered and Threatened Wildlife and Plants (11 December 1978 Federal Register) that are reported to have ranges in Michigan (33). The peregrine falcon is considered an occasional migrant, the only known timber wolves in Michigan are located on Isle Royale. Though the longjaw cisco formerly was found in Lakes Michigan, Huron, and Erie, it was last reported from Lake Erie in 1961 and is considered extinct in Lakes Michigan and Huron (28). In addition to the above listed species, the list of endangered species as presented in Michigan's Endangered and Threatened Species Program (28) include the deep water cisco (Coregonus johanna), blackfin cisco (Coregonus nigripinnis), and

the shortnose cisco (Coregonus reighardi). All but the shortnose cisco are considered extinct in Lake Huron (28). The shortnose cisco primarily inhabits deep water (200 feet or more) and should not be affected by the project. The eastern pipistrelle (Pipistrellus subflavus), a common cavity-dwelling bat in much of eastern United States was reported on one occasion in Michigan's Upper Peninsula, in an abandoned mine tunnel. It is expected that this pipistrelle may be scarce or absent in other parts of Michigan (28). The Hart's-tongue fern (Phyllitis scolopendrium var. americanum) is listed as endangered in Mackinac County on both the Michigan and Federal Endangered and Threatened Species lists. This member of the fern family is highly localized in disjunct areas on rock ledges and crevices, cool slopes, or sinkholes of dolomite or other calcareous rock. However, due to the nature of the project area (i.e., lack of suitable habitat) no endangered or threatened flora or fauna are expected to be impacted by the proposed project.

2.46 The lake sturgeon (Acipenser fulvescens) has been placed on Michigan's Endangered and Threatened Species Program as threatened. This fish became so scarce by the 1920's that sturgeon fishing was prohibited throughout most U. S. waters of Lakes Superior, Michigan, and Huron. The species now occurs in Michigan in less than five percent of its former abundance. Recently, however, there are places where a regulated sport fishery is compatible with maintenance of the species. The proposed project is not expected to adversely affect this fish species nor its associated sport fishing benefits.

2.47 Bald eagles (Haliaeetus leucocephalus) and osprey (Pandion haliaetus) generally are found in Michigan along undisturbed areas associated with water. Nesting success is currently monitored by the U. S. Fish and Wildlife Service and Forest Service biologists. In 1975 a nesting survey found 61 resident pairs of eagles and 46 pairs of osprey in the Upper Peninsula. Guidelines protecting nest sites and restricting human activities in nest vicinities are incorporated in

forest management plans (28). Disturbance of these species is not expected to be any more severe than the present activity level associated with the recreational boater use of this waterway.

Cultural Elements, Aesthetics

Archaeological/Historical - The National Register of Historic Places (29) has been consulted and subsequent issues of the Federal Register have been reviewed. The National Register of Historic Places lists 12 sites in Mackinac County. No districts, sites, buildings, structures, or objects deemed significant in American history, architecture, archaeology, or culture by the Secretary of the Interior are in the project area, nor have any sites in the project area been identified as eligible for inclusion in the Federal Register (8).

The Michigan History Division (30) prepared an inventory of over 1,200 districts, sites, buildings, structures, and objects significant in Michigan. This inventory includes those sites listed in the Federal Register as well as properties listed in Michigan's State Register of Historic Sites (8). No locations are near to the project area, as indicated in a letter from the State Historian (Appendix 3).

Population - The permanent population of Clark Township, which encompasses most of the Les Cheneaux Island area together with a small section of the hinterland, was 1,563 in 1960 and 1,771 in 1970, an increase of 13.3%. During this 10-year period, the Mackinac County population decreased 11.0% from 10,853 to 9,660.

Economy - The community of Cedarville (about 400 persons) is growing rapidly because of its location near the Les Cheneaux Islands and because of the physical assets of its shorelines which provide excellent opportunities for fishing and boating. Tourist-oriented businesses and commercial recreation are important contributors to the local economy and are increasing along Michigan highways 134 and 129. Cedarville has several motels, one grocery store, four

restaurants, and one construction company. Marinas with winter storage and other services are also important commercial establishments. This community provides educational facilities at the high school level for the large surrounding area. Because of its ideal location, Cedarville has great potential for recreational facilities and second-home development. The population of Cedarville is increasing. The new residents are mainly retired people (32).

Existing Land Use - The transfer site is located immediately south of the Cedarville commercial district at the new boat launch site. There is one residential structure adjacent to the transfer site and a limited number are situated in the commercial district. The use of land adjacent to the transfer route varies. There are scattered residential dwellings and a few commercial buildings, but the majority of the area along the transfer route is under tree cover and open space.

Environmental Use or Management Areas - The Munuscong State Forest is located approximately one mile north of Cedarville on the west side of State Route 129. The Hiawatha National Forest is located approximately eight miles west of Cedarville.

3. RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS.

3.01 Clark Township has a Land Use Plan and Zoning Ordinance in effect (14). The proposed transfer site is in an area that is planned and zoned for public use, the disposal site is part of an area set aside for recreation, forestry, and agriculture. The disposal site is a 40-acre parcel owned by the Department of Natural Resources and leased to the Township for use, in part, as a sanitary landfill. The proposed project would utilize only a small portion of the site, leaving a substantial buffer between the disposal area and adjacent properties. The township is to discontinue its use of this landfill site for a new regional county dump. Prior to returning the property

to the Michigan Department of Natural Resources, the township is required to cover the dump with soil. Use of the landfill for the Corps' confined disposal site would satisfy this requirement, as well as providing an area suitable for the disposal of the proposed dredge material.

3.02 One of the major plan concepts in the Clark Township Master Plan (1967) is to improve the port facilities in Cedarville. The proposed project is in harmony with the long-range objectives of the Township Master Plan (14).

4. PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

A. General

4.01 Dredged sediments which are unsuitable for release into open water would be transported by shallow draft scow to the new marina site on Meridian Road near the extreme northwest end of the harbor. A shallow access channel would be dredged to allow the scow to reach the boat launch. The scow would be anchored to two pile clusters near one end or the other of the launch. Unloading directly into water-tight dump bodied trucks would be accomplished by crane and clamshell. The dump truck bodies would be covered and the material hauled through Cedarville Village to a site immediately adjacent to the Clark Township dump for confined disposal.

4.02 The confined storage area would occupy nine acres within the exterior toe of the dikes. Seven acres would be available for the disposal of dredged material. The north part of the confined disposal area would be banked against the existing landfill there. Materials from the site would be used for the dike core and off-site materials would be used as needed. Clay would be imported from an area not yet designated in order to construct a 24-inch thick liner for the dike walls. A 24-inch thick layer of in-situ (on site) clay can be

relied upon to seal the floor of the facility. An oil skimmer and weir for controlled overflow would be positioned in the southeast corner of the diked area.

4.03 The following discussion deals with the probable impacts of dredging an access channel to the marina, unloading, transfer of materials, construction, and other operations at the confined disposal site.

4.04 The nearshore area at the proposed access channel site is composed of silt and clay, in which a few scattered bulrushes, and water lilies grow. These would be removed by access dredging.

4.05 The net effect of access dredging upon the food chain, involving somewhat less than one-half acre of scattered plant and bottom sediments, would be long-term and significant. Removal of detritus feeders, increased turbidity in the water column and resettling of suspended sediment would occur. This near-shore area, which could support food producing plants and sessile benthic organisms, would be permanently lost. Mechanical abrasion by suspended sediments could be as injurious to members of the aquatic food chain as the suspended matter. The proposed dredging operations would result in a temporary reduction in benthic productivity in the dredging locale and areas immediately adjacent to it. Changes in the benthic populations of the waterway would result in the loss of potential food organisms for resident fish populations. However, unaffected adjacent areas would provide substantial and sufficient food organisms. Fish populations in the dredging area could further be reduced by turbidity and loss of vegetative cover for rearing and feeding. Habitat for other aquatic organisms, including immature aquatic insects and shallow hunting territory would be removed. The overall effect of the proposed project would be the temporary loss of those organisms that cannot escape the area during the operation. This impact would be mitigated by the expected replenishment that would occur from adjacent undisturbed

areas. Organisms that are capable of mobility would move out of the area during the operation but would return to the area in time once project related activities are over.

4.06 The low concentration of potentially toxic material in the Cedarville Harbor channel sediments is such that little incorporation or accumulation of toxic materials into the area's food chain is expected. The net effect of the release of any materials from the sediments would be negligible, aside from organic nutrients.

4.07 The Les Cheneaux Islands, including the Cedarville Harbor access channel dredging site, have been classified by the Eastern Upper Peninsular Regional Planning and Development Commission as an "area of particular concern". The extent of recreational boating and numerous small marinas, plus the proximity of the town of Cedarville, would preclude designation of the location as a sanctuary, refuge, or aquatic environmental study area.

4.08 The natural drainage characteristics of the adjacent uplands would not be altered by the dredging and transfer operations. Slumping along the dredged access channel would occur. Except during storms, local nearshore current patterns are influenced by Pearson Creek which discharges adjacent to the launching site. The dredging site is not a storage area for storm or floodwaters, and it is not a prime natural recharge area.

4.09 To facilitate dike construction at the township dump, an additional 5.5 acres of coniferous forest would be cleared. The forest canopy includes white spruce, balsam fir, and black spruce. Buffalo-berry is conspicuous in the shrub stratum while shinleaf occurs in the herbaceous layer. Various northern "feather" mosses and lichens are found in the ground cover. There would be total removal of wildlife habitat with the displacement of associated animals. Once the dikes have been constructed grass would be planted to stabilize the slopes against erosion. Revegetation of the interior of the disposal

site would occur rapidly through the natural successional process from adjacent undisturbed areas.

B. Wetlands

4.10 No detrimental environmental impact on wetland habitat would occur at the proposed confined storage area at the upland dump site because there are no wetlands in that area.

C. Submerged Vegetation

4.11 Any submerged or floating-leaved, rooted aquatic vegetation would be destroyed by the proposed work. Local elements of the vegetation would be lost; however, there would be no change in community composition or species diversity because extensive adjacent elements of this vegetation type exist.

D. Water Quality

4.12 The north end of Les Cheneaux Harbor in the area to be dredged for access to the marina is a eutrophic, turbid environment. Dredging the access channel is expected to reduce light transmission and to destroy some numbers of the local nektonic and planktonic communities. Placement of clean material at the open lake disposal site (Plate I) would result in a temporary increase in turbidity and suspended solids which reduces light penetration. No significant, harmful effects on water quality have been identified from open lake disposal of material suitable for this type of disposal.

4.13 The total volatile solids, chemical oxygen demand, phenol, total Kjeldahl nitrogen, and oil and grease levels of the sediment found in some of the areas to be dredged exceed the recommended maximum as defined by the Environmental Protection Agency. The sediments in the area to be dredged for access to the marina are likely of similar quality, being located close to the mouth of Pearson Creek. The impact

of release of some of these chemical constituents during the access dredging operation is anticipated to be minor in view of the deteriorated environment of the surrounding area.

4.14 Release of water from the area would be by controlled overflow consisting of clear, oil-free water, which would be monitored by the Corps of Engineers on a regular basis to detect any undesirable substances. Mitigative measures would be taken if monitoring indicates a need to do so. Release of overflow from the confined disposal area on the upland site is not expected to produce significant increases in the flow of Pearson Creek because of distance from the creek and the opportunities for seepage and evaporation in the intervening distance (Plate VIII). Therefore, no turbidity effects would be anticipated in Pearson Creek. The overflow area would be appropriately equipped with splash absorbing materials in order to minimize any erosion at the overflow point. In all construction and operations, contractors would be required to adhere to the pertinent parts of the Michigan Inland Lakes and Streams Act 346 of 1972 and the Michigan Soil Erosion and Sedimentation Control Act 347 of 1972.

4.15 Type C botulism, which affects certain waterfowl, could occur if waterfowl come into contact with highly organic, contaminated sediments in the confinement structure. In order to minimize the possibility of infection, the confinement area would be drained in a manner to prevent it from becoming a desirable waterfowl feeding area.

E. Benthos, Including Shellfish

4.16 The benthic community consists of isopods, scuds, insect larvae, snails and bivalved mollusks. The diversity of such species is high, although total numbers are low. A temporary local depletion of benthic organisms would accompany dredging in the immediate project area, while some reduction in numbers would occur adjacent to the access channel due to sediment burial. The net effect of access channel dredging on the benthos would be temporary. The overall effect upon the ecology of the Bay would be minimal.

4.17 Disposal of material in open water areas would smother benthic organisms. The surviving organisms and those in adjacent undisturbed areas would commence recolonization after termination of disposal activities. Depending on the degree of light loss, because of the increased turbidity and suspended solids, the life cycle of certain organisms could be affected adversely. To minimize adverse impacts on benthos, the proposed site for open lake disposal (Plate I) was chosen instead of a deeper site, because it is much more accessible to divers for firsthand evaluation (refer to response for MDNR comment 1, on page 67 of this document). This method of inspection, not presently feasible in deep waters, would help determine where the least biologically sensitive areas are located. Because of these precautions, the expected impacts on benthos would be temporary, and minor in magnitude.

4.18 Replacement of the rip-rap at the mooring site by the retaining walls would eliminate a rocky shoreline habitat and could destroy or displace invertebrate and vertebrate organisms associated with it.

4.19 There would be a minor long-term beneficial effect associated with the disposal of unsuitable sediments in the seven acre clay-lined confined disposal site upon the trophic condition of the Les Cheneaux area due to removal of these sediments to permanent upland storage.

F. Fishery Resources

4.20 Fish would tend to leave the immediate area of dredging and unloading due to temporary decrease in dissolved oxygen and increased turbidity. Fish eggs and young could be removed by dredging or smothered by the settling of sediments. Destruction of feeding grounds, cover, and nursery areas would occur in the one-half acre dredging area; but habitat losses have already occurred in this area associated with the initial construction of the Clark Township launching facility. Disturbance of the area would be carried over after project completion due to a potential increased recreational boat use.

4.21 Anadromous species of fish are infrequently reported for Cedarville Harbor. However, in order to minimize any potential adverse impacts to fish spawning in the area, and at the request of the Michigan Department of Natural Resources, dredging would be postponed until July.

G. Wildlife

4.22 The net effect of habitat loss in the dredged area upon wildlife which feed in the adjacent nearshore areas would be minimal.

4.23 Clearing at the proposed upland confined disposal site could result in loss of marginal white-tailed deer habitat and displacement of short-tailed shrew. A portion of the existing dump site would be covered and used for confined disposal. Racoon, skunk and porcupine are omnivorous scavengers at the dump and would lose a local feeding area. The present disposal of harbor sediments from the construction site at the Clark Township Launching Facility has concentrated herring gulls feeding on sediment detritus at the dump (Photograph 2, Appendix 2). The clay lining and ultimate sealing of the diked disposal area would prevent the migration of potentially toxic materials into the forest and area water sources.

H. Recreation

4.24 Some hindrance to public fishing and recreational boat launching and unloading would occur during movement of the scow from the channel to the marina and during unloading. Mooring of the scow near the south end of the marina launching area should minimize this interference. Operations could be carried on during non-peak fishing periods to lessen the interference.

4.25 No effect on recreational use of wildlife resources should result due to access channel dredging.

4.26 No major detrimental effect would result from the access channel dredging, better accommodation for recreational boating would occur. Dredging of the channel would allow safer and surer movement of recreational boats, a benefit for boaters and marina operators.

4.27 Stabilization and reclamation of the diked dredge material by vegetative plantings would create a forest opening and habitat diversity which would be a net long-term benefit of the project. Habitat diversity leads to increased carrying capacity for various wildlife species, particularly deer, in otherwise suitable game range.

4.28 Beneficial changes in potential recreational hunting use of the area should result from eventually increasing suitable game habitat.

I. Vectors

4.29 In the area to be dredged, there would be a net positive impact in removing habitat which is suitable for biting, pestiferous insects (shallow, nearshore waters). In the confined disposal area and the immediate proximity of the dump site, which is populated with shore birds and abundant insects, there should be no significant impact of any new insect breeding areas due to the distance of the site from populations. There are several hundred feet of trees between the site and the nearest roadway. Should problems develop, treatment with biodegradable insecticides, drainage improvements, or soil cover should mitigate the situation.

J. Air Quality

4.30 Dredging of the access channel, transfer, transportation and operations at the confined disposal facility should have minor impact upon air quality due to exhaust emissions. Local odors of a musty kind are anticipated during operations. Odors are caused by biodegradable substances and would diminish or disappear between operations, especially with prompt drainage of the facility. In between operations, drying of the dredge material could result in production of fine material which could blow about in the wind. This will be mitigated by the

perimeter of trees and the generally isolated area; but if problems develop, the surface of the diked material can be moistened to prevent the formation of dust. It is, however, expected that a natural plant growth would readily cover the diked material thereby providing protection against wind erosion.

K. Socioeconomic Effects

4.31 Short-term economic benefits would be realized during construction and during the scheduled dredging/disposal periods. Local business and motels would realize increased business. Increased employment in construction would depend on the contractor chosen and the number of outside tradesmen brought in.

4.32 Moving the dredge material from the transfer site to the disposal site would involve the transport of the material over local residential roads. Clark Township records of the area show a total of 29 homes and 14 commercial establishments along the truck route. The trucks are expected to travel from the transfer site north on Meridian Road (M-129) to State Avenue, then west to the entrance road of the Township landfill site. It is expected that the trucks would make 30 to 40 round trips a day during daylight hours, 6 days a week. Duration of the operation has been estimated at 4 months for the initial removal of the accumulated backlog. The annual shoaling, estimated to be 4,000 cubic yards, would be removed as required, this is expected to occur once every five years. Noise output for this type of equipment is in the range of 70-95 decibels (dBA) at 50 feet and 44-69 dBA at 1,000 feet from the source (34). For comparison, the expected decibel rating for a quiet residential neighborhood is 40 dBA. The average amount of noise expected from this work would fall within acceptable limits for this type of operation. Trucking the material would also result in a temporary increase of dust during the operation. Local regulations and codes would be met.

4.33 The location of dredging and transfer equipment at the transfer site would have an adverse visual effect on the aesthetics of the harbor during construction and disposal periods.

4.34 No property tax base would be lost as the disposal site is now tax exempt.

4.35 The increased truck traffic on local roads between the transfer site and the disposal site would conflict with other traffic and may create additional maintenance of the local road system which would be the responsibility of the contractor.

4.36 Dredging of a new channel to seven feet deep between the maintained channel and the boat launching dock area in the harbor would allow larger sail and power boats with drafts up to seven feet to use the launching and docking facilities. Increased use of the harbor as a result of the increased depth would have a beneficial impact upon the tourist-related business in the area.

L. Flooding

4.37 Dredging of the access channel would have no impact whatever upon conditions or potential for flooding in the area. Flooding is entirely determined by the level of Lake Michigan. The upland confined disposal site is far above the 100-year flood plain, and construction of the confined disposal facility will not interfere with any floodway or other flood related features.

M. Commercial Fishing

4.38 No commercial fishery exists in Cedarville Harbor.

N. Endangered and Threatened Species

4.39 Numerous endangered, threatened, and rare species frequent the Les Cheneaux Islands. Threatened bird species include the double-crested cormorant, the bald eagle, the marsh hawk, and the osprey. Quite rare or scarce birds are the common loon, the black-crowned night heron, the american bittern, and the sandhill crane. All of these

species use wetland habitat during a portion (or all) of their spring-summer-fall stay in Northern Michigan. The common loon and american bittern were seen in marshes east of the Cedarville Harbor. These rare and endangered species could be disturbed during project operations; however, the effect would be minimal and no more severe than current boating and fishing activities which already cause disturbance of the harbor.

4.40 A snail (Amnicola binneyana), listed as "Threatened" (28), inhabits mud bottom at 15 feet or greater depths along the margins of the Great Lakes and could be found in these waters. The cisco or lake herring is regarded by the Great Lakes Fishery Laboratory as rare or threatened in Lake Huron (28). This species is confined to deep water in Lake Huron and would be unaffected by the project action.

4.41 No endangered, threatened, or rare plant or animal species appear in the upland area to be cleared. The dump site is not a normal part of the hunting territory of large raptorial birds; therefore, impacts on the bald eagle, the marsh hawk, and the osprey should not be anticipated.

0. Municipal Water Supplies

4.42 There are no municipal water supplies in the harbor area. However, some residents of Cedarville have a harbor intake for household water, preferring this to the ground water which is locally discolored and bad tasting. Without adequate control upon the number and location of such lake intake points, assessment of the impact of dredging activities upon the quality of the water supply is difficult. However, the turbid natural environment of the harbor suggests that the dredging operation would add little to the hazard of a domestic potable water intake in the harbor. Use of the upland site for confined disposal could result in improvement in the local ground water supply. Local deterioration of ground water quality in the Village of Cedarville, the location of the existing dump, the generally pervious nature of the bedrock aquifer, and its vulnerability to contamination from the surface, suggest that the existing landfill may be imparting some

ground water problems now. The act of sealing several acres of existing dump site with clay and diverting runoff from the dump site immediately north of the confined disposal facility should substantially reduce the amount of leachate and contaminated runoff from the dump site that would enter the water table directly by infiltration. Lining the confined disposal area with clay will prevent any contamination of the ground water supply due to the confined disposal operation.

P. Summary of Beneficial and Adverse Effects and Mitigating Measures

4.43 Beneficial impacts include:

- (1) The confined disposal area, if reclaimed for "forest opening", would furnish improved diversified wildlife habitat.
- (2) Upland confinement of contaminated sediments is beneficial to the trophic conditions of the Les Cheneaux Island channels in Lake Huron.
- (3) The selection of an upland disposal site and consequent need to provide a seven-foot deep access channel to the transfer site, coupled with present mooring and launching facility construction, enhances Cedarville Harbor for recreational boaters. This would have a beneficial effect on the commercial interests in the harbor area.
- (4) There would be increased economic benefits to area businesses and perhaps some increase in local employment during construction and operations.
- (5) Sealing of presently unconfined refuse at the Clark Township dump site and diversion of surface water from other parts of the dump site would result in improved ground water quality.

4.44 Adverse impacts include:

- (1) Construction involves noise, dust and traffic interference. Noise and dust at the proposed confined disposal site would be mitigated by its isolation from residences and roadways. Dust can be mitigated with control measures such as sweeping and spraying to settle it. There would be traffic interference with boaters at the transfer site, and there will be interference with road traffic in town along the haul route to the confined disposal site. Traffic and operations and construction at the transfer site will create local distractions due to noise. Construction at the transfer site would have a negative visual impact. Scheduling operations during normal working hours would lessen the noise and visual impacts.
- (2) Increased truck traffic on local roads during construction, and during operations between the transfer and disposal sites, may create additional maintenance costs and roadway repair which would be the responsibility of the contractor.
- (3) Disturbance of the tranquillity of the Cedarville Harbor area for nesting birds and for waterfowl staging area during anticipated fall construction. This would be mitigated by existing large expanses of alternative suitable wetland in the Les Cheneaux Islands.
- (4) Potential release of harmful concentrations of contaminating substances at controlled overflow points would be minimized through settling out of solids in the confined area, skimming, and the discharge water quality monitoring program.
- (5) Temporary ponding in the diked area could create a breeding area for mosquitoes. Should problems with insects develop, biodegradable insecticides, cover, or drainage improvements are mitigating measures that could be used.

- (6) Construction of the mooring area would replace the rip-rap with sheet piling, which is a poorer habitat for animal species.
- (7) Maintenance dredging of the channels and open water disposal of the dredged materials would destroy or temporarily disturb benthic, planktonic and nectonic communities. Short term adverse impacts upon all communities would occur due to turbidity increases, greater chemical oxygen demand, an increase in solids and nutrients and a decrease in oxygen.
- (8) Possible musty, earthy odors at the confinement site during and in-between operations would be mitigated by the isolation of the site. The possible threat of type C botulism to wildfowl would be mitigated by keeping the containment area as well drained as practicable during the project period.
- (9) Dredging and construction operations would cause minor inconveniences to recreational boaters and would have a temporary adverse effect upon fishing in these areas.

Q. Relationship to other Navigation Projects in the vicinity

4.45 There are several Non-Federal facilities adjacent to the Les Cheneaux Island channels. The sites include a state owned boat launching ramp in Cedarville and one in the town of Hessel, which is located three (3) miles west of Cedarville. Also in Hessel are several marinas, two boat works and a municipal dock. Throughout the entire waterway one can find a multitude of private navigation projects generally limited to small boat slips or piers constructed by waterfront residents. This construction is now under the Corp's permit program.

R. Conclusions

4.46 Habitat loss in dredged areas and at the mooring site are the only significant long-term adverse impacts. Long-term positive benefits would include improvement in the sediment condition of Cedarville Harbor by confinement of contaminated materials, enhancement of the harbor for recreational boaters through construction of a seven-foot deep access channel to the marina, the probable ultimate use of the confinement site as a forest opening with more diverse wildlife than at present, and ground water quality protection effected through sealing of a portion of the Cedarville Township dump site. Short-term adverse impacts attending construction would occur, but there would also be short-term positive economic benefits to area commercial interests resulting from construction employment.

4.47 Contaminated dredged material has limited value to the local community because Public Law 91-611 governs the disposal of materials which are unsuitable for release into open water. This means that contaminated dredged material cannot always be utilized for the most valuable use by the local community due to the limitations imposed by the construction and operation of a confined disposal facility.

4.48 The proposed improvement in the Cedarville Harbor, including the confined disposal facility, would result indirectly in social and economic benefits to the area. Section 122 of the Public Law 91-611 presents possible areas of impact that should be considered in relation to the proposed operations. These areas include, but are not limited to:

Noise	*Public Services
*Displacement of People	*Desirable Regional Growth
Aesthetic Values	Employment
*Community Cohesion	Business & Industrial Activities
*Desirable Community Growth	*Displacement of Farms
Tax Revenues	Man-made Resources
Property Values	Natural Resources

Public Facilities (including Air Pollution
water supplies) Water Pollution

4.49 Impact areas listed above, which are preceded by an asterisk, are not expected to be affected in any perceptible way by the proposed action. The remaining areas have been discussed throughout Chapter 4.

4.50 On September 5, 1975, the Environmental Protection Agency published regulations for discharge of dredged or fill materials in navigable waters (40 CFR 230). This regulation requires that consideration be given to wetlands, fisheries, shell fish, water quality, benthic organisms, submerged vegetation, nutrients, turbidity, rare or endangered species, wildlife and recreation. Each of these items has been addressed in detail in preceding paragraphs of this section and other sections of the report. In accordance with paragraph 230.5 of this regulation, plans include measures to minimize adverse effects and enhance beneficial effects. The proposed action is in full compliance with the requirements of the regulation. The Water Resource Council's "Principles and Standards" were also consulted and followed throughout the preparation of this environmental statement.

4.51 On July 22, 1975, the Corps of Engineers published regulations covering all of its dredging operations. This regulation, 33 CFR 209.145, has provisions for issuance of public notices, holding of public meetings or hearings, coordination of planning with State and Federal agencies, and final approval of disposal sites by the Environmental Protection Agency. All of the requirements of this regulation will be met prior to beginning construction of the project.

4.52 Section 404 of the Clean Water Act of 1977 (33 U.S.C. 1344) requires that the Corps of Engineers apply to its own projects the same criteria used in evaluating projects requiring a dredge or fill permit. A public notice addressing the proposed fill in the waters of the Les Cheneaux Island channels at the transfer site was published and mailed on 6 September 1978. To date, no comments have been received objecting to the proposed fill operation. Provisions of this regulation

(Section 404) have been fully complied with and are addressed in detail throughout Sections 4 and 5 of this report. A State of Michigan Water Quality Certification, as specified under Section 401 of the Clean Water Act of 1977, is included in Appendix 7.

4.53 The following narrative discusses the probable impacts of maintenance dredging on the environment.

4.54 Maintenance dredging would impact the project in two basic areas: the recreational channels of the Les Cheneaux Islands, during and after the actual dredging operation, and the transfer and disposal areas.

4.55 Dredging would produce a series of short-term impacts, such as a disruption of boating and sportfishing, noise, and water quality deterioration. These impacts should have little lasting effect on the ecology of the dredged areas.

4.56 The areas to be dredged (see Plate I) experience continued movements of sediments as materials are deposited and redistributed by the currents of Lake Huron, recreational craft propeller wash, and ice movement.

4.57 If present, bottom organisms and aquatic plant growths would be removed along with the dredged materials.

4.58 Although not extensively studied, the dredged areas should be repopulated by benthic species. Repopulation of organisms, which are mobile or prolific reproducers, would begin upon settling of the suspended solids. Other, less prolific sedentary organisms, would require longer periods of time before repopulation is complete.

4.59 Water quality in the areas to be dredged would be impacted by increased turbidity caused by the proposed operations. This temporary increase in turbidity caused by suspended solids would reduce light penetration. Depending on the degree of light loss, the life cycle

of certain organisms could be adversely affected. A temporary depression in the Dissolved Oxygen concentration in the water at the operational sites would also occur. Fish species inhabiting these areas would tend to avoid these conditions until normal Dissolved Oxygen levels are restored.

5. UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

5.01 Unavoidable adverse impacts of construction and operations include interference with road traffic, noise, exhaust emissions, visual impact, and possibly dust. Dust would be mitigated by sweeping or sprinkling to settle it. Noise and visual impact can be mitigated by confining project activities to normal working hours. Traffic interference can be eased by reducing or eliminating construction and operations traffic during peak traffic hours.

5.02 Unavoidable adverse impacts of construction and operations at the access channel and marina transfer area include noise, exhaust emissions, visual impact, interference with navigation, and loss of aquatic habitat.

5.03 The clearing of approximately 5.5 acres at the upland disposal site would destroy or displace the wildlife species which inhabit it. No endangered, threatened or rare species of wildlife (or plant) exists in the area so that impact would be minimal.

5.04 Construction of a retaining wall at the mooring area would displace or destroy existing vertebrate and invertebrate animals inhabiting the rip-rap which is presently there.

5.05 Maintenance dredging and open water disposal of materials would disrupt or destroy benthic habitat and cause temporary, but a wide-spread decline in water quality.

6. ALTERNATIVES TO THE PROPOSED ACTION

6.01 The proposed action involves the periodic maintenance and backlog dredging of the Les Cheneaux, Michigan, Federal Navigation Channel by the United States Army Corps of Engineers as authorized by Congress. This involves the removal of the shoaling sediments and disposal of some dredged materials into confined disposal facilities and others into open water.

6.02 Alternatives to the proposed disposal methods are: 1) disposal of all sediments to open water; 2) confined disposal; and 3) pretreatment of materials. In terms of economic engineering feasibility, irretrievable resources, and minimal ecological disruption, the process of confined disposal for sediments unsuitable for open water release offers the best alternative at the present time. The ultimate solution depends on adequate control of upland erosion with the resultant soil runoff and reductions in contaminants from municipal and commercial discharges.

6.03 Four alternatives are discussed as possible alternatives for disposal: A) all material disposed in open water; B) diked disposal; C) pretreatment of material; and D) no action.

A. Open Water Disposal

6.04 Open water disposal is the least costly alternative, if material suitable for open water disposal is used. The major portion of the Les Cheneaux shoaled material was classified by the EPA as suitable for only restricted open lake disposal. This method, however, was estimated at a higher cost (refer to Estimate of Cost, Appendix 6, page 6-3) as well as being in conflict with the Governor of Michigan's request to discontinue disposal of contaminated dredged material in the open lake water. In addition, greater public use of this resource can be realized as a cover for the discontinued landfill operation.

B. Alternative Diked Disposal Sites

6.05 A total of five sites were considered for confined disposal of sediments. A selection committee consisting of members of the United States Fish and Wildlife Service, the United States Army Corps of Engineers, and the Michigan Department of Natural Resources, conducted the inquiries leading to the final site selection. This process began in 1974. The sites are shown in Plate I.

6.06 Site 1 (Clark Township Landfill) was judged to be the most acceptable of all proposals. Dredge material would be trucked to Site 1 and placed as fill over the Township dump.

6.07 Site 2a (boat ramp) was judged to be the most acceptable as an interim handling area prior to trucking. Effort will be made to schedule maintenance dredging so as to minimize conflict with boaters using the launching facility.

6.08 Site 2b (expanded boat ramp) proposal would require filling of additional wetland and was not acceptable to the committee.

6.09 Site 3 (downtown site) proposal required disturbance of a wetland area and was not acceptable to the committee. In addition, Clark Township anticipated difficulty in acquiring the necessary real estate rights.

6.10 Site 4 (golf course site) is located in a wetland area and is unacceptable from an environmental standpoint.

6.11 Site 5 (Government Island site) is part of the Hiawatha National Forest and is unacceptable from an environmental standpoint. This site is not shown on Plate I. This site is located at the east entrance channel on the southeast side of Scammons Harbor approximately seven miles from Cedarville.

C. Pretreatment

6.12 Treatment of dredge material could be accomplished in several ways: 1) local sewage treatment works; 2) separate on shore treatment plants; and 3) on-board treatment prior to in-lake discharge.

6.13 Assuming the removal of a moderate amount of dredging, i.e., 1,000 cubic yards of material per day, a 0.5 percent slurry of that amount would be a volume equivalent to the wastewater discharge of 0.25 million people. Existing sewage treatment plants do not have the capacity to treat these additional volumes. Costs for new treatment plants are prohibitive, and chemical treatment to settle the suspended solids is expensive. In addition, chemical flocculation in conjunction with open lake disposal could cover lake bottoms with sediments unsuitable for biological production.

D. No Action Alternative

6.14 Without an acceptable site provided by a local sponsor according to provisions of Public Law 91-611, no dredging would be done. Continuous shoaling of the channel would eventually impede the movement of recreational craft and deny usage of this harbor of refuge. Existing and planned public and private harbor facilities would become useless as the channel decreases in its ability to provide safe and adequate navigation. Area businesses that are dependent on transient, as well as local, boater commerce would suffer. The environmental impacts of dredging and disposal would be absent with this alternative.

6.15 In terms of economics, practicality, irretrievable resources, and minimal ecological disruption, the process of confined dike disposal offers the best solution at the present time.

7. RELATIONSHIP BETWEEN SHORT-TERM USE OF MAN'S ENVIRONMENT AND
THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

7.01 Upland confinement of sediments which are unsuitable for release into open waters contributes to long-term improvements in the trophic condition of the Les Cheneaux Islands and the Great Lakes. The confined dredged material site will be given over to use as a forest ecotone after the ten-year project period.

8. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES WHICH
WOULD BE INVOLVED SHOULD THE PROPOSED ACTION BE IMPLEMENTED

8.01 Commitments of labor, materials, fuel and equipment will be required in construction and operations.

8.02 Much of the present dump site would be sealed with an impermeable clay liner, and drainage from part of the remaining dump site would be diverted. This should result in long-term improvement in the quality of the ground water beneath the site, which flows toward the Cedarville community.

8.03 Construction of the confined disposal facility would eliminate marginal wildlife habitat and second-growth coniferous forest in the amount of approximately 5.5 acres.

8.04 Continued maintenance dredging of access and navigation channels will result in disruption of associated aquatic habitats.

8.05 Future use of the confined disposal site is circumscribed by the rural and generally isolated nature of the confined disposal site setting, but the conversion of the completed project area into forest ecotone will make it into a more useful natural resource than it is at present.

9. COORDINATION, COMMENT, AND RESPONSE

A. Public Participation

9.01 The first contact of local government was made prior to November 1974 with the Clark Township Supervisor, Cedarville, Michigan, to discuss the selection of a confined disposal site for the containment of material unsuitable for lake disposal dredged from the Small Boat Course Federal navigation project at Les Cheneaux Island in Lake Huron, Michigan. These proposed dredged materials had been classified as unsuitable for lake disposal by the U.S. Environmental Protection Agency based on 1973 and 1976 sampling. The Clark Township Supervisor and U.S. Army Corps of Engineers met 26 September 1974 to consider the ramifications of confined disposal site selection. At this meeting, Public Law 91-611, requirements of a suitable site, the need of an environmental impact statement for the project, and adequacy of a proposed 9-acre piece of Clark Township property proposed for confined disposal were discussed.

9.02 On 9 June 1976 a site selection meeting was held in Cedarville, Michigan. The 9-acre site originally proposed by Clark Township is wetland owned by the Department of Natural Resources. This site was subsequently removed from consideration. Two sites (Township Airport and Township Dump) were presented by the Township, while three other sites were mentioned, including Government Island, and Hiawatha National Forest. The feasibility of truck transfer of material to an inland site was considered. After review of the Township sites offered, the Les Cheneaux confined disposal project was temporarily placed on a hold status until a suitable confined disposal site was proposed.

9.03 An additional field visit by the diked disposal site selection committee was made to the Les Cheneaux Islands on 27, 28 and 29 September 1976. This visit was attended by the Corps of Engineers, Mich-

igan Department of Natural Resources, U.S. Fish and Wildlife Service, and the U.S. Environmental Protection Agency. All members of the committee were in favor of the Clark Township dump "landfill site", while various opposition was made to three other Township ideas. The Government Island site was dropped from consideration due to the low access channel depths and complications associated with the U.S. Forest Service jurisdiction. The Township dump was selected as the repository for dredge material at Cedarville.

9.04 A 7 December 1976 public workshop was held in Cedarville to consider five possible sites presented in the November 1976 Environmental Assessment, "Alternative Sites - Les Cheneaux Dredge Disposal Area". At the workshop, each site proposal was explained and discussed with the audience. All people seemed to favor the Township dump. Local officials were still strongly in favor of Site 4; and following the workshop, the Township Supervisor on 15 December 1976 again urged use of Disposal Site 4. The State of Michigan holds title to part of this wetland area. The officers of the Les Cheneaux Islands Association appeared divided in support between the Clark Township Dump and the Wetland Site 4 adjacent to the Taylor Lumber Company.

9.05 On 23 February 1977, a meeting was held in State Senator Robert Davis' office (Lansing) to discuss the project. All concerned parties were represented, including Clark Township and State and Federal Government agencies. All Township representatives agreed that the Clark Township dump and an interim transfer site at the new launching facility, Cedarville Harbor, would be satisfactory. Subsequent confirmation of this agreement was received by the Township Supervisor, 15 March 1977.

B. Government Agencies

9.06 The following government agencies have been contacted for information in the preparation of the Draft Environmental Impact Statement:

- (1) Eastern Upper Peninsula Planning and Development Commission
- (2) Luce-Mackinac-Alger-Schoolcraft District Health Department
- (3) Michigan Department of Natural Resources
- (4) U.S. Fish and Wildlife Service
- (5) U.S. Environmental Protection Agency
- (6) U.S. Soil Conservation Service
- (7) State Historic Preservation Office
Michigan History Division

9.07 This project is reviewed for compliance with the following laws: the Fish and Wildlife Act of 1956, Fish and Wildlife Coordination Act of 1958; National Historic Preservation Act of 1966; National Environmental Policy Act of 1969; Endangered Species Act of 1973; Water Resources Development Act of 1976; Executive Order 11990, Wetlands Protection, May 1977; Water Quality Act of 1977; Clean Water Act of 1977; as well as the Congressional actions authorizing construction and maintenance of the Federal navigation channels.

9.08 Government Agencies. The following governmental agencies have been contacted in coordinating the Final Environmental Statement.

- (1) U.S. Department of Interior - Heritage Conservation and Recreation Service.
- (2) U.S. Environmental Protection Agency
- (3) U.S. Fish and Wildlife Service
- (4) Michigan Department of State

(5) Michigan Department of Natural Resources

9.09 Environmental Review. In addition to the above coordination, timely distribution of the final report was made to the following government agencies, interested groups and individuals:

Federal Agencies

Advisory Council on Historic Preservation

U.S. Department of the Interior

U.S. Department of Commerce

U.S. Department of Agriculture

U.S. Department of Transportation

U.S. Department of Health, Education, and Welfare

Federal Energy Regulatory Commission

State Agencies

Michigan Department of State Highways and Transportation

Michigan Department of State - Michigan History Division

Michigan Department of Agriculture

Michigan State University - Conference of Michigan Archeology

Michigan Department of Commerce

Local Agencies

Mackinac County

West Michigan Shoreline Regional Development Commission

Les Cheneaux Chamber of Commerce

Clark Township

Environmental - Civic Groups

Michigan United Conservation Clubs

Historical Society of Michigan

National Audubon Society

Izaak Walton League

Sierra Club

Michigan Student Environmental Conference

Michigan Audubon Society

Michigan Natural Areas Council

Individual Citizens

9.10 Copies are available to interested individuals upon request from
U.S. Army Engineer District, Detroit, P.O. Box 1027, Detroit, Michigan
48231, Attn: Environmental Resources Branch

9.11 Comments on the Draft Environmental Statement and responses to them are listed in the following section. Copies of the original correspondence are included in Appendix 5.

COMMENTS AND RESPONSES

FEDERAL AGENCIES

Federal Energy Regulatory Commission

1. Comment: Comments of this office are made in accordance with the National Environmental Policy Act of 1969 and the August 1, 1973 Guidelines of the Council on Environmental Quality. Our principal concern with this development is its effect on bulk electric power facilities including potential hydroelectric developments and on natural gas pipeline facilities.

Since the above noted proposed project apparently would pose no major obstacle to the construction of such facilities, we have no comments on the Draft EIS.

Response: Thank you for your review.

United States Department of Agriculture

Soil Conservation Service

1. Comment: The draft environmental statement does not state clearly how rainfall runoff from the disposal site will be handled.

Response: All water that accumulates within the disposal site, either through the actual dredging operation itself or any precipitation, would be removed from the disposal by means of the outlet structure as described in paragraph 1.08.

2. Comment: The draft environmental statement indicates that a permanent seeding will be accomplished at the end of the ten-year

project period. We would like to suggest that consideration be given to making temporary seeding during the project period. We believe that a temporary seeding could be very effective in controlling potential wind erosion and would be more practical than attempting to wet down the area after wind erosion starts, as is suggested in the statement.

Response: The slopes of the proposed dikes would be planted to prevent erosion. From observation of earlier such disposal facilities, it has been noted that the interior portions of a disposal site are readily replanted by airborne seeds from adjacent undisturbed areas. This process has been observed to occur as early as the first growing season after deposition of the dredged material. Therefore, it is thought that the interior surface of the area would be stabilized by natural revegetation. However, should a problem arise necessary planting would be done.

United States Department of Agriculture

Forest Service

1. Comment: We believe that the final statement should address the reestablishment of plant cover on the confined disposal facility, as we have indicated in our comments on the Frankfort and St. Joseph Harbors draft environmental statement.

Response: Please refer to the revised paragraph 4.09 of this report.

United States Department of Commerce

Assistant Secretary for Science and Technology

1. Comment: This is in reference to your draft environmental impact statement entitled, "Confined Disposal Facility and Maintenance Dredging

of the Federal Navigation Channels Les Cheneaux Islands, Michigan." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight (8) copies of the final statement.

Response: Eight copies of the FEIS will be forwarded as requested.

Great Lakes Environmental Research Laboratory

1. Comment: Analysis of sediment from the bottom of Les Cheneaux Islands navigation channels produced confusing results. The 1973 sampling by the Environmental Protection Agency (EPA) indicated that all bottom deposits are polluted and therefore not suitable for open lake disposal. In discussing the 1976 sampling, EPA found that all sediment are suitable for unrestricted or restricted open lake disposal. It appears that the main difference is in criteria used for determination of pollution level. Standards for 1973 sampling were based on criteria established for all waters of the nation and are grouped into two groups, non-polluted and polluted. The 1976 standards were based on compilation of data from over 100 different harbors in the Great Lakes and were grouped in three groups -- non-polluted, moderately polluted, and heavily polluted. Non-polluted sediments are suitable for unrestricted open lake disposal. Moderately polluted sediments are suitable for open lake disposal with certain restriction and only the heavily polluted sediments must be placed in confined disposal facilities. The 1976 sampling indicated that 25% of the channels have unpolluted sediment, 60% have unpolluted/moderately polluted, and 15% have moderately polluted. None of the sediments were found to be heavily polluted.

Considering the basic question of how to dispose of the dredged material, the Impact Statement provides incorrect or confusing information. For example, paragraph 1.02 states that in 1973 and 1976, sediments to be dredged from the Les Cheneaux Island Channels were identified as unsuitable for open lake disposal by the EPA. Paragraph 1.16 states that portions of the channel bottom sediment are considered suitable for open water disposal.

In view of the very high costs of spoil disposal on land, including the adverse environmental impacts associated with such disposal, a detailed examination of pollution sources appears to be highly justified. The Statement indicates that the shoals are believed to originate from the shallower natural lake bottom on each side of the previously dredged channels (par. 1.05). In this situation, disposal of the spoil in the open lake is fully justified, since there would be a futile effort to improve nature lake environment. In discussing harbor sediment quality (par. 2.20) this Statement finds that the primary source for these contaminated sediments may have come from untreated waste originating from the Village of Cedarville and its environs. It appears that placement on land of the spoil from the vicinity of Cedarville probably could be justified, although the 1976 EPA survey allows restricted open lake disposal. If disposed in the lake, a site in deep water, say over 100 foot in depth, should be used.

Response: Those areas of confusion surrounding the 1973 and 1976 sampling results have been clarified in revisions of the subject paragraphs addressed above. Please also refer to the response for Michigan Department of Natural Resources comment 1, page 67, and Plate I, page 75 of this document for the discussion and location of a potential open water site.

National Ocean Survey

1. Comment: On page 11, please change 575.38 feet to 575.35 feet (lowest levels), and 581.0 feet to 581.04 feet (high levels).

Response: Please refer to paragraph 2.11 for your recommended changes.

2. Comment: Geodetic control survey monuments may be located in the proposed project area. If there is any planned activity which will disturb or destroy these monuments, NOS requires not less than 90 days notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project includes the cost of any relocation required for NOS monuments.

Response: Prior to the start of any work, all such geodetic control survey monuments in the project area would be located. Precaution would be taken so as not to disturb any of the monuments, however, if the project would impact a monument the suggested procedures for notification of NOS would be followed.

United States Department of the Interior

Office of the Secretary

1. Comment: We find that the subject letter report does not include adequate provisions to protect recreational interests. A proposal to develop the Cedarville Boat Mooring/Launching Facility with assistance from the Land and Water Conservation Fund was approved by the Lake Central Region, Bureau of Outdoor Recreation, on January 25, 1977 (Project 26-00815). It does not appear that the proposed use of the launching area as a land transfer site for bottom materials would be inconsistent with the designated use of the facility for recreation, given adequate provisions and protection under the proposed channel maintenance dredging project.

Response: All necessary provisions would be taken to prevent any damage to the launching facility, its operation, or the associated recreational activities.

2. Comment: The draft statement indicates that the movement of scows from the channel to the boat launching area and the unloading of dredged bottom materials could be scheduled to take place during non-peak recreation periods (Section 4.24, page 31). We recommend that these operations be scheduled as mentioned above and provided for in the letter report. To further avoid or minimize conflict with recreation, we also recommend that the feasibility of conducting project-associated dredging during non-peak recreation periods be examined by the U.S. Army Corps of Engineers and coordinated with the Bureau of Outdoor Recreation. For example, it is possible that backlog dredging can be initiated at or near the end of the prime recreation season and completed prior to the formation of a restrictive ice cover. If feasible, the letter report should provide for project-associated dredging to take place outside the prime recreation season and the effects of the scheduling should be amplified in the final statement.

Response: Proposed activities would continue to be coordinated with appropriate authorities throughout the project operations. All activities would be carried out so as to have the least impact on the normal activities of the area and its residents. Recommended changes and revisions to the project can be found in the proper sections of this Final Environmental Impact Statement.

3. Comment: The letter report indicates that the dredging contractor will be responsible for repairing any damages to the boat launching facility that may be caused by dredging (page 6, last paragraph). We assume that the dredging contractor will also be responsible for damages that may occur during the transfer of bottom materials. This should be clarified in the letter report and mentioned in the final statement.

Response: Please refer to paragraph 4.35, Section 4 of the Environmental Impact Statement and the response to the first comment made by the U.S. Department of Transportation.

4. Comment: The draft statement is generally adequate in its discussion of environmental resources within our area of jurisdiction and expertise, with exception to the issues raised in our comments on the letter report.

Response: Revisions have been made to this document addressing the subject concerns. Please refer to the appropriate sections.

United States Department of Transportation

Federal Highway Administration

Region V

1. Comment: The statement indicates the dredged material will require truck hauling over the local road system through the village of Cedarville. The proposed action should be coordinated with the local road officials relative to the designation and use of the local road system for hauling, adequacy of the proposed haul routes to handle the anticipated loads, traffic control, signing, maintenance and rehabilitation of the haul roads used.

Response: The recommended coordination was carried out through the planning stage of the proposed project. Further coordination would be continued throughout the construction and post-construction periods. As a standard clause in a contract for trucking services, it is required that the contractor be responsible for the maintenance, repair, and establishment of safety precautions (signs) for roads used. If, in order to improve conditions, a roadway is upgraded, this upgraded condition would be maintained.

2. Comment: The Letter Report (page 9) indicates conventional dump trucks may not be suitable for hauling. If special hauling equipment is necessary, these requirements should also be developed in cooperation

with the local road officials as they relate to the structural capacity and geometrics of the haul roads selected.

Response: Such coordination would be part of any change to the original proposed plan.

United States Department of Transportation

Saint Lawrence Seaway Development Corporation

1. Comment: SLSDC has reviewed the subject EIS's and has no comments to offer. Thank you for the opportunity to examine these documents.

Response: Your review of the subject EIS is appreciated.

U.S. Environmental Protection Agency

1. Comment: The first sentence in paragraph 1.02 gives one the impression that all sediments in the Les Cheneaux Island Channels are unsuitable for open lake disposal. The sentence should be revised to explain that sediments to be dredged from some reaches of the Les Cheneaux Island Channels were identified as unsuitable for unrestricted open lake disposal. Similar revisions are necessary in other paragraphs of the EIS.

Response: Please refer to the subject paragraph for the recommended change and clarification.

2. Comment: According to paragraph 1.08, the 7 acre upland disposal area "...will be entirely sealed with an approximately 24" thick layer of clay to prevent potential contamination of groundwater supplies..." We agree that at least 2 feet of clay should be used to seal the sides and floor of the disposal area. The plates on pages 60 and 61 should

be corrected to show 24" thick clay seal instead of a 12" thick clay seal. The location of the Clark Township Landfill as shown on Plate 1A (page 55) should also be corrected.

Response: Plates V and VI have been changed to show the planned 24 inches of clay seal.

3. Comment: The discussion in paragraph 2.20 refers basically to the conclusions of the 1973 bottom sediment survey. This discussion should also describe the conclusions of the 1976 survey and the guidelines used for the 1976 survey (these are included in the EIS on pages 1-20 and 1-21).

Response: The additional information has been added.

4. Comment: The status of the Clark Township Harbor Improvement Project (paragraphs 2.32 and 2.37), and future plans of the "new dredged maneuvering area" should be disclosed. Reference is made in the EIS to a "new marina site on Meridian Road." The dependency of the marina site on the proposed project and the existence of any permits for marina construction should be discussed.

Response: The harbor project has been completed. This and any other proposed recreational boat facility expansions in the area would be handled independently of the Corps' project but would be directly influenced by it. The new launching ramp is owned by Clark Township. Once the 10 year project life is completed the maneuvering area would be allowed to shoal in, unless the State of Michigan or the town of Cedarville wants to maintain it as part of the existing facilities or any future expansion. Whatever the case, the proper permits would need to be secured from both Federal and State agencies.

5. Comment: The Draft EIS should more clearly identify the magnitude of increased truck traffic, and explain whether road spills or noise impacts to local residents would be significant enough to warrant the inclusion of specifications in any contract for construction and maintenance of the proposed project.

Response: Please refer to paragraph 4.32.

6. Comment: The number and general distance of local residences having wells along Meridian Road or State Avenue Road from the proposed disposal area should be noted. The likelihood of seepage through the clay liner of the disposal area and local wells being contaminated from this seepage should be discussed. Consideration should be given to the depth of the wells, their location, their groundwater flow, and local cones of depression from well pumping requirements. To assure satisfactory protection of local wells, and possible contamination resulting from the construction and operation of the proposed disposal area, a monitoring program should be established to periodically check for the occurrence of adverse surface or subsurface water quality changes in the vicinity of the disposal area. Residents in the near vicinity of the disposal area should also be encouraged to have their well water periodically tested by the County or State Department of Public Health for potability. It is important that overflow from the disposal area not cause water quality standards to be violated in any receiving waters.

Response: Past experience with similar disposal sites employing a clay seal has shown that there isn't a release of dredged material or any of its harmful constituents through the liner or the dike. This data was derived from test wells that were placed into the dike walls and around the perimeter of the disposal site. It is not expected that the proposed operation would adversely impact the area's groundwater. In fact, there is the possibility that groundwater contamination, attributable to the present use of the area as a landfill, could be significantly lowered if not eliminated.

7. Comment: According to Public Notice NCEED-T for the Diked Disposal Area, Les Cheneaux Island Channels, Michigan, dated September 6, 1978, the method of upland disposal was concluded to "...be less expensive..." than restricted open water disposal that "...the greatest public interest would be derived by utilizing the material as cover for the township dump." Paragraph 6.04 of the EIS should be revised to reflect the conclusion expressed in the Public Notice.

Response: The suggested change has been made to paragraph 6.04 of this report.

COMMENTS AND RESPONSES

STATE AGENCIES

Michigan Department of State

Michigan History Division

1. Comment: Our staff has reviewed the following project and concludes that it will have no effect on cultural resources.

Confined Disposal Facility/Maintenance Dredging of the Federal
Navigation Channels, Les Cheneaux Islands

Response: Thank you for your review.

Department of State Highways and Transportation

1. Comment: We concur with the DEIS's contention that the Cedarville Township dump represents the site location alternative that will result in the least adverse environmental impacts. However, we do not believe the DEIS adequately addresses the impact of the project. Therefore, we suggest attention be given to the following items in the Final Environmental Impact Statement (FEIS):

Response: Your review is appreciated

2. Comment: The DEIS recognizes the high potential for pollution of project area groundwater supplies. The DEIS also states on page 4 that "Should the dredged material be unduly wet or sloppy, specially lined, gasketed, or otherwise, compartmented trucks may be required to prevent spillage of the polluted material along the haul route." It is the suggestion of the EIS that given the recognized potential for groundwater pollution that the FEIS indicate use of covered, water tight dump trucks will be made a hauling contract requirement.

Response: Based on the nature and composition of the sediment to be dredged and past trucking operations, it is expected that the sediment would not contain a sufficient quantity of water to have it leak or spill from the trucks. However, should it be determined at the start of the dredging operations that such a problem would occur, the sealed trucks would be used. All precautions would be taken to keep the dredged material from re-entering the area's water sources.

3. Comment: The DEIS states that "Sealing of presently unconfined refuse at the Clark Township Dump site and diversion of surface water from other parts of the dump site would result in improved groundwater quality." However, it does not indicate whether the existing unconfined refuse will be removed prior to placement of the clay seal, or whether the seal will be placed over the refuse.

Response: A two foot thick layer of clay would be used to line the disposal site. The dredged material is being used to provide a cover for the refuse in this landfill. please refer to paragraph 3.01. Refuse would not be removed or covered with clay; it rests on in-situ clay that would competently seal the floor of the facility.

4. Comment: The ELS suggests the FEIS require either the refuse be removed prior to placement of the clay seal, or that the dikes be extended below ground level to an elevation below that of the refuse. Use of one or both of these procedures would aid in preventing possible contamination of groundwater through horizontal movement of the same.

Response: The lining of the site would keep the dredged material from escaping but also remove the landfill material from the influence of precipitation. In addition, a series of runoff diversion ditches (see Plate V) would be provided to further isolate the refuse and alleviate any potential for groundwater contamination.

5. Comment: The FEIS should also call for the drilling of wells in both bedrock and glacial drift to the north and south of the site to allow for monitoring of the disposal site's affect on groundwater quality.

Response: Past experience with confined disposal sites of this type have shown that 2 feet of clay prevents any seepage or leaching of the dredged material from the site. The design of the facilities would also eliminate groundwater contamination that could be attributable to the landfill refuse. The groundwater will be monitored by using observation wells.

6. Comment: The DEIS states that the Cedarville Marina boat launching site will be used for the transfer of dredge material from scow to dump trucks. As this procedure could adversely affect use of the ramp by recreational boaters or facilities constructed with monies from the Land and Water Conservation Fund Act of 1965, the results of prior coordination with the Bureau of Outdoor Recreation should be shown in the FEIS.

Response: In the planning stage of the proposed project, coordination was carried out with the appropriate Federal, State, and local agencies to analyze the potential impacts of the project. The Heritage Conservation and Recreational Service (HCRS), formerly the Bureau of Outdoor Recreation, was contacted by means of the Corps' multiple mailing of the Draft Environmental Impact Statement to the U.S. Department of Interior. Telephone communication with the HCRS resulted in the information that the letter from the U.S.D.I. would have included a comment on any recreational or cultural resource impacts if, in fact, the proposed project would affect these areas of concern.

7. Comment: Although the DEIS discusses the impact of the project on endangered and threatened species, it does not show the results of prior coordination with the U.S. Fish and Wildlife Service and Michigan Department of Natural Resources, as required by Section 7 of the Endangered Species Act of 1973. The results of such coordination should be included in the FEIS.

Response: Please refer to the previous comment. The U.S. Fish and Wildlife Service is a member of the Site Selection Committee which selects the site for the confined disposal facility. Continued coordination would be carried out through the entire development of the project.

8. Comment: It is our suggestion that the FEIS discuss the feasibility of using the material dredged from unpolluted areas for beach nourishment or road construction, as confined disposal of unpolluted material constitutes a waste of a valuable natural resource.

Response: There is an estimated 18,000 cubic yards of shoaled material that is suitable for open lake disposal. This material would be placed in an open water disposal site unless a more suitable means of disposal is offered and made available. To date, no such offer has been made.

9. Comment: It is apparent that transfer of material from the marina to the disposal site will involve having heavy trucks crossing M-134. It is, therefore, our position that the Department's District Traffic Engineer in Newberry, Paul Michelin, be contacted to see if the location and number of anticipated crossings warrant the replacement of truck crossing signs.

Response: As part of any contract for trucking, it is the responsibility of the contractor to provide the necessary safeguards for a hazard free operation. This includes the installation of additional road signs where needed.

Michigan Department of Natural Resources

1. Comment: The draft indicates a possibility of some open water disposal of unpolluted materials. However, your telephone conversation with Dr. Tierney on December 27, 1978, suggested that all materials may be contained in the upland fill site. If any open water disposal is considered, it should be south of a line running from the north point of Tobin Reef to the south end of Goose Island. This will prevent inundation of sensitive spawning areas.

Response: Plate I shows the proposed open water disposal site. Prior to its use, the site would be inspected by a team of divers which would include a biologist. The divers would collect sediment and benthic samples, take photographs and perform a reconnaissance of the site's aquatic environment. The divers would look for such items as gravel beds and any potential finds of archaeological significance. Moving the site to deeper water (over 100 feet) would preclude it from any such investigation because of the depth. This would result in a lack of data pertaining to the potential impacts associated with the disposal at the site. This could result in an adverse impact to such little known deepwater species as the deepwater cisco. Past dives to water depths of 100 feet showed increased activity levels of fish and insect larva versus high energy shallow areas. All findings would be coordinated with the MDNR prior to any disposal at the site described in the environmental statement. If the data obtained shows the site as unacceptable or there is continued emphasis for a site lakeward of the one described, the Corps would make plans to accommodate this recommendation.

2. Comment: The timing of dredging activities is crucial to protect both birds nesting on adjacent shorelines and spawning fish. Because at least one threatened and several rare bird species nest in the area, dredging during nesting activities is not recommended. In order to avoid spawning and nesting periods, yearly dredging should be postponed until July.

Response: Dredging operation schedules would be coordinated with the MDNR prior to dredging.

3. Comment: The extension of the launch site for off loading of dredge spoils by 25 to 30 feet seems excessive. It is hoped that as much bottomland as possible will be saved from filling by reducing this extension.

Response: The proposed steel sheet pile cells have been designed to only extend 20 feet out from the existing launching facility. Construction activities would be carried out in a manner that would cause the least amount of adverse effects.

4. Comment: Beyond the points mentioned above, this Department sees no major problems inherent in this project.

Response: Thank you for your comments.

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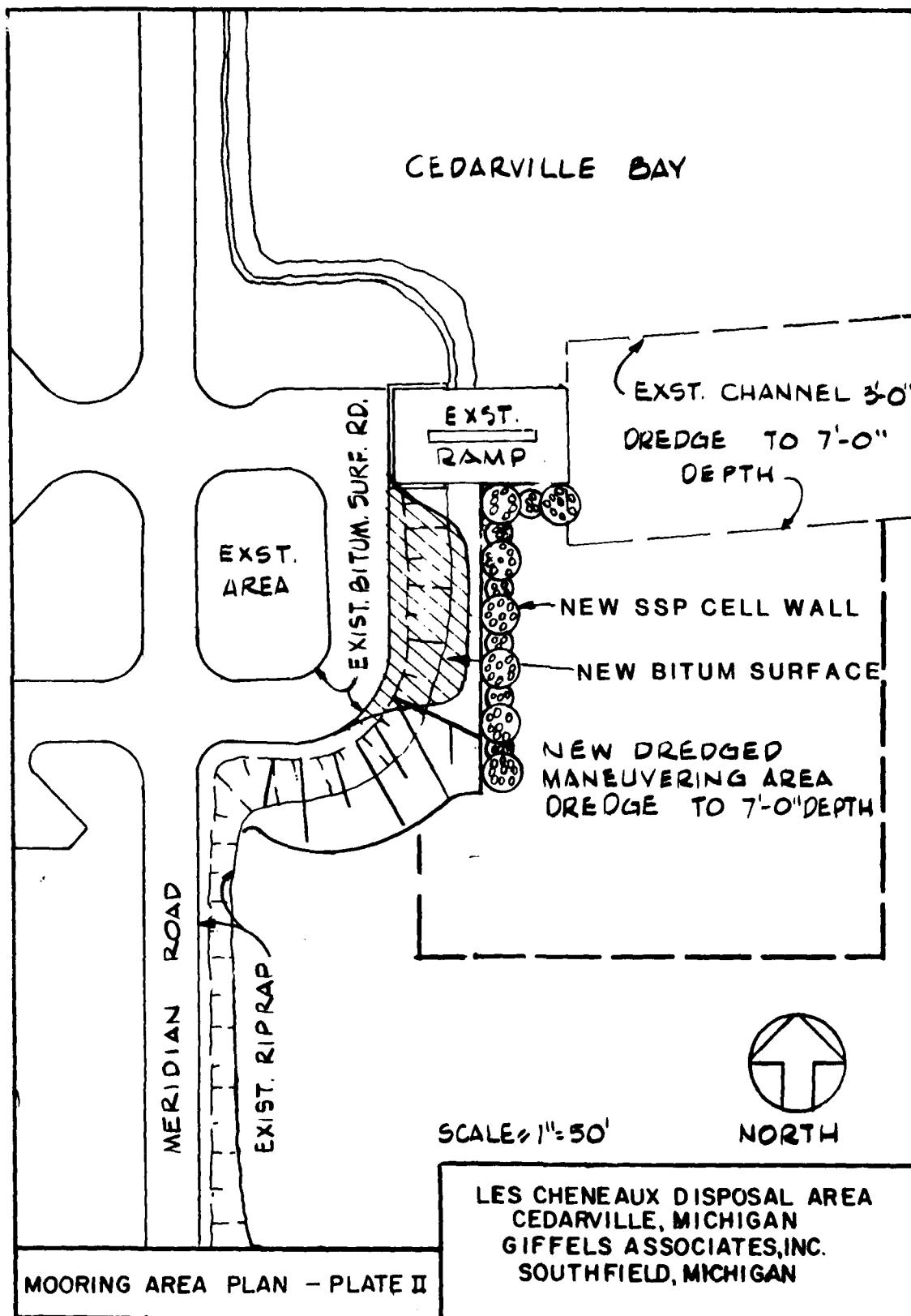
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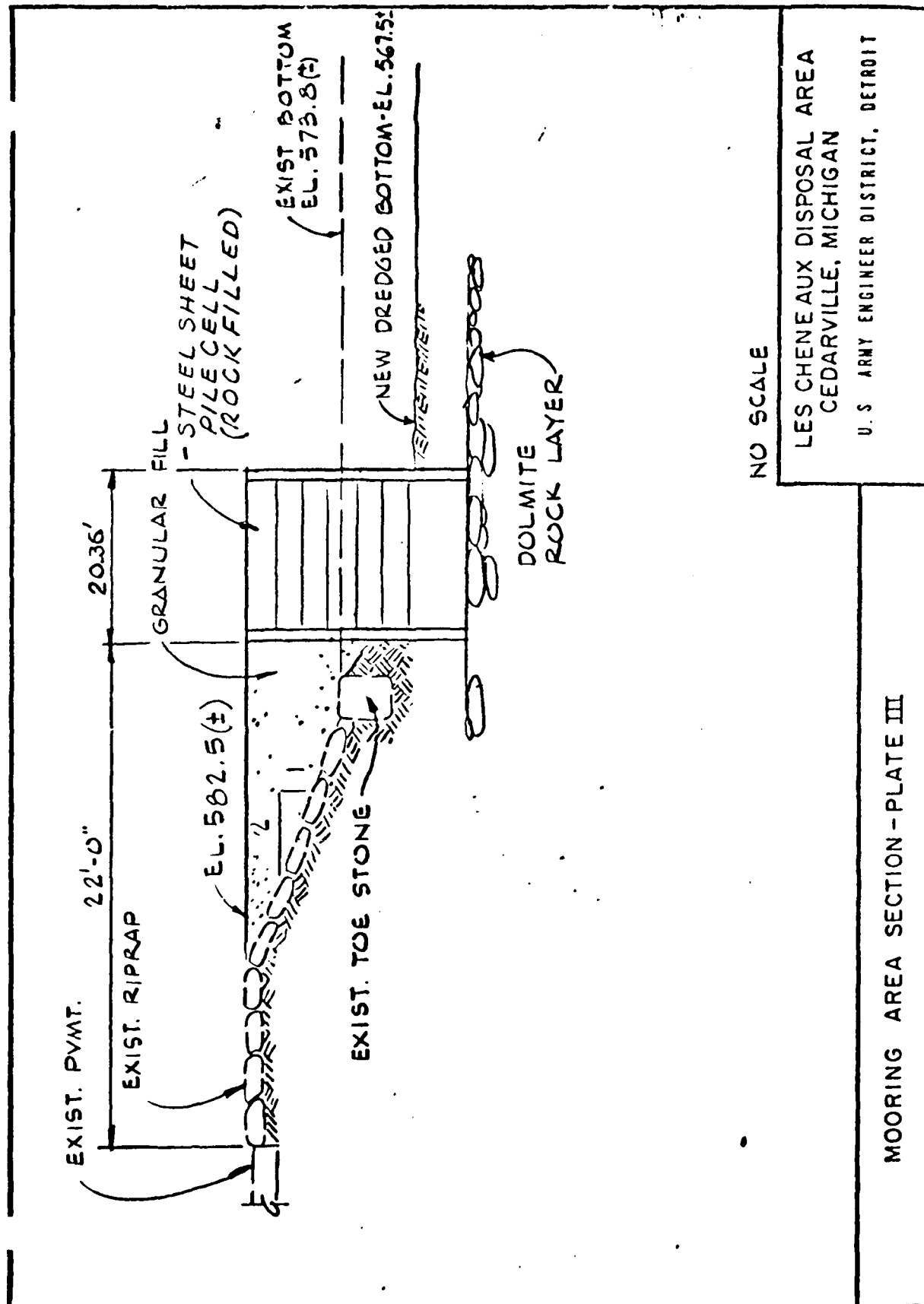
GLOSSARY

Accretion	- Natural or artificial buildup of land by the action of air or water deposition.	Dike	- A mound of earth, sand, clay or other substance on land or in the water designed and built to confine materials.
Aerobic	- Any biologic process which requires oxygen to function.	Dissolved Solids	- The total amount of dissolved material, organic and inorganic, contained in water or wastes.
Anadromous	- Type of fish that ascends rivers from the sea (or lake) to spawn.	DO	- Dissolved Oxygen. The oxygen freely available in water. Unpolluted water will contain more DO than polluted water.
Anaerobic	- Any biologic process which does not require oxygen to function.	Dredge, Clam-Shell	- A large mounted crane with a split-bucket or clam-shell suspended from it, powered by steam or diesel, which operates by dropping its clam-shell to the bottom by gravity where it is closed and lifted, along with the sediments it catches, from the bottom by wire cables. Generally used for dredging soft sediments, sand and gravel.
Aquatic Plants	- Plants rooted in the substrate that grow in water, either floating the surface, growing up from the bottom of the body of water, or growing under the surface of the water.	Dredge, Hydraulic	- A barge or ship mounted vacuum suction device, sometimes fitted with an "eggbeater" type cutter head, powered by steam or diesel, which operates by breaking up the sediments with the rotating cutter head and may pump the material from the bottom through pipes to a discharge point at some distance from the equipment, in the water, on land or into a confinement facility. Generally used for dredging silt, soft sediments or sand. Operates with about 20% solids and 80% water.
Aquifer	- A hydraulically continuous volume of the ground water which yields useful quantities of water to wells.	Dredge, Ponar	- A bottom sediment sampling device which operates similar to a clam-shell dredge. Usually used to sample soft silt, sand and fine gravel sediments and associated benthos during aquatic surveys.
Artificial Nourishment	- The process of replenishing a beach by artificial means.	Dredging	- A method for deepening and widening streams, swamps or coastal waters by scraping and removing solids from the bottom to restore the authorized depths in the established projects.
Bay-mouth Bar	- A bar extending partially or entirely across the mouth of a bay.	Ecotone	- The edge between two or more different communities (e.g., the transition between forest and grassland).
Benthic	- Relating to the water-substrate interface at the bottom of a stream or lake.	Endangered Species	- A species of plant or animal which is in danger of extinction throughout all or a significant part of its range.
Benthos	- Bottom dwelling organisms; uniformly applied to animals associated with substrates.	Environmental Impacts	- A phrase used to express the extent or severity of an environmental effect; the impact.
Biomagnification	- Increasing accumulation of a substance (such as mercury) from organism to organism in the food chain.	Eutrophication	- Natural processes which result in water quality reduction via nutrient enrichment. Eutrophication over time changes open lakes to swamps and eventually to dry land.
BOD	- Biochemical Oxygen Demand. A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water.	Fauna	- The animals, terrestrial or aquatic, of a region.
Breakwater	- A long narrow (rubble mound) pile of rock, concrete or sand; a structure in the water designed to break or moderate the effect of storm driven waves. Usually placed out into the water from shore at an entry channel to provide safer boat or ship navigation during stormy weather.		
Carrying Capacity	- Sustained use (or production) of the land without environmental degradation.		
COO	- Chemical Oxygen Demand. The amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water.		
Coliform	- Any of a number of organisms common to the intestinal tract of man and animals, whose presence is an indicator of pollution.		
Conductivity (Specific Conductance)	- A measure of a solution's capacity to convey an electric current.		
Coriolis Effect	- The tendency of moving air masses to change direction continuously in response to the earth's rotation.		

Fecal Coliform	- A group of organisms common to the intestinal tract of man and of animals.	Percolate	- Downward movement or infiltration of water through the pores or spaces of rock or soil.
Flora	- The plants, terrestrial or aquatic, of a region.	Permeable	- Able to allow water to seep through.
Food Chain	- Energy transformations - Movement of food from one form of life to another; for example, algae to zooplankton to fish.	pH	- A measure of the relative acid or alkaline state of water. pH is measured on a scale of 0 to 14. A pH of 7 is neutral, a pH below 7 is acid, a pH above 7 is alkaline. Rainwater is usually slightly acid.
Foredune	- That zone of shoreland immediately inland of the beach and the result of windblown sediment deposition.	Phenols	- A group of organic compounds that in very low concentrations produce a taste and odor problem in water.
Granular	- Sand and/or gravel in composition referring to sediments.	Phosphorus	- An element that while essential to life, contributes to the eutrophication of lakes and other bodies of water.
Ice Ages	- The late Pleistocene Epoch, a period of time which ended in Michigan approximately 2,000 years ago and which was marked by glaciers and extensive raising and lowering of the Great Lake levels.	Phytoplankton	- The algae of the open water of lakes, rivers, and streams.
Impermeable	- Able to confine water without any seepage.	Phytosociology	- The study of plant associations.
Interface	- The point at which two substances, such as water and bottom sediments, come together.	Piers	- Permanent structures constructed of stone, steel, concrete or a combination of those materials, which are used to define and stabilize entry channels from the open lake into a harbor.
Leach	- To remove a substance by water filtration or percolation.	Rare Species	- An extremely uncommon species limited in distribution.
Littoral	- The shallow waters that extend along the shoreline of a lake or sea.	Riprap	- A layer, facing or protective row of stones randomly placed to prevent erosion, scour, or sloughing of a structure or embankment; also the stone so used.
Littoral Drift	- The sediments moved in the littoral zone under the influence of waves and current. Direction of movement or "transport" of littoral materials depends upon wind and wave direction.	Scow	- A barge equipped with trap doors in its bottom which is used for moving and dumping dredge spoil.
Longshore Current	- Somewhat similar to littoral drift.	Sediments	- Clay, sand, gravel or stones which have been eroded from the land or from beneath the water, have been transported by river or lake currents, and re-deposited.
Low Water Datum	- 1980. An approximation in the plans of mean low water that has been adopted as a standard reference plane.	Selcho	- Fluctuations above or below "normal" water level in a basin caused by wind, barometric pressure or a combination of both -- resulting in a rise or fall on shore over a period of hours.
Marsh	- A wetland dominated by herbaceous vegetation; primarily sedges, reeds, and grasses.	Sheet Steel Piling	- Interlocking lengths of steel driven into a stream, lake or harbor bottom next to the shore to prevent storm, wave or ship damage.
Monitoring Program	- To study the amount of pollutants present in the environment.	Shoal	- A place where water is shallow, sometimes created by a sandbar, in the shipping channels, created by deposition of eroded material.
Mooring Facility	- A place where a ship, barge, or scow is fastened.	Silt	- Finely divided particles of soft or weak. Often carried in cloudy suspension in water and eventually deposited as sediment.
Moraine	- Glacial till, or sediments deposited directly from ice.		
Nekton	- Aquatic organisms (larger than zooplankton) which swim freely in the water.		
Nutrient	- Elements or compounds essential as raw materials for organism growth and development; for example, carbon, oxygen, nitrogen, and phosphorus.		
Organic	- Material derived from organisms, leaves, sticks, animals, fish, etc.		
Outwash	- Sediments deposited directly from glacial meltwater streams or lakes.		

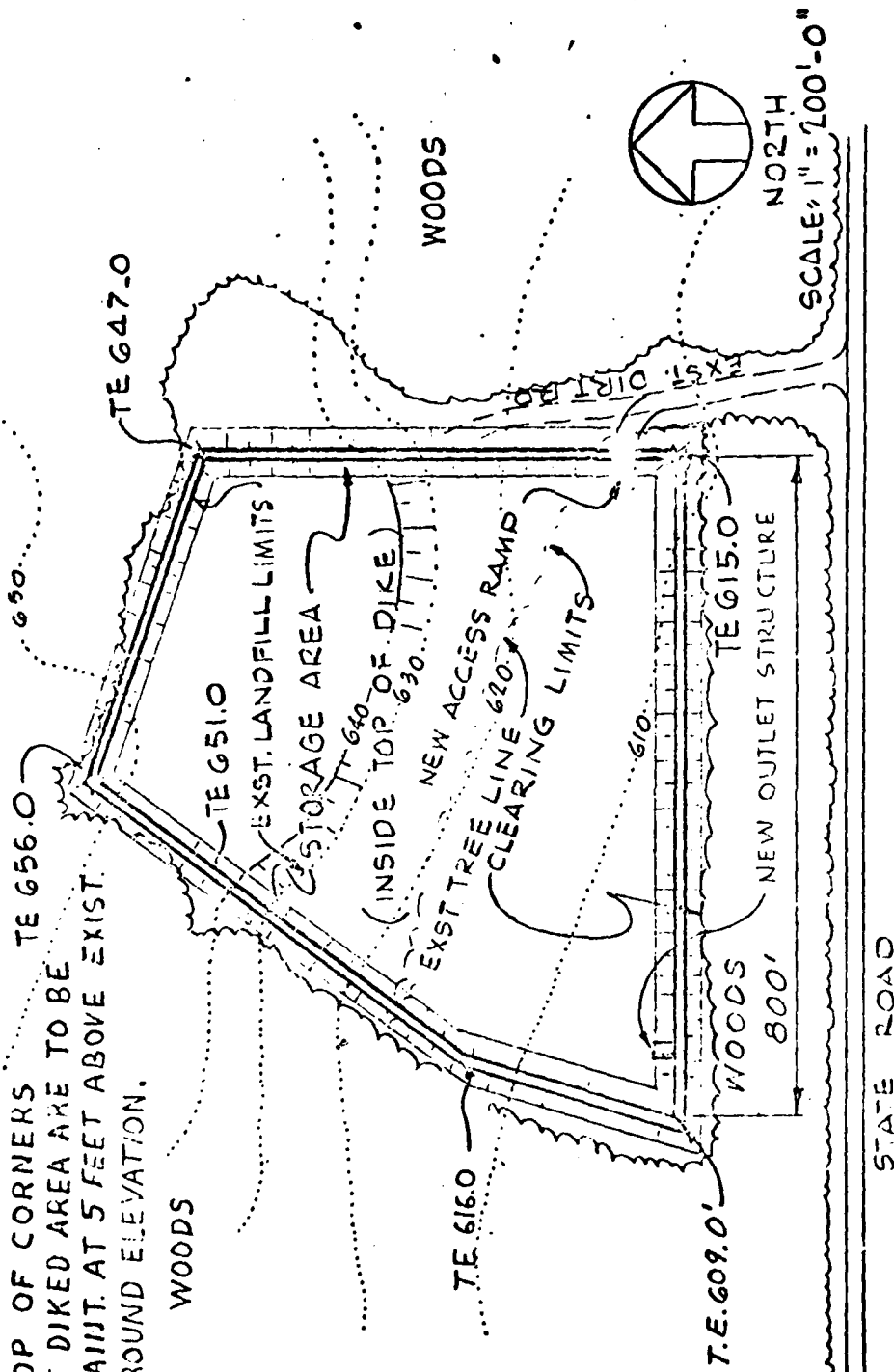
Spoil	- Sediments which have been dredged from beneath the water.
Staging Area	- Major concentrations of waterfowl or shorebirds occurring on certain lakes and ponds during spring and fall migration.
Succession	- The change in species composition from initial colonizing organisms to a diverse stable community.
Surface Water	- Atmospheric water that runs off to collect in streams, ponds, lakes, swamps, marshes, etc.
Terrace	- A level area marking a period of constant lake water elevation.
Terrain	- The general natural setting of the land surface of an area as imparted by a particular geological process.
Threatened Species	- A species which is likely to become endangered because of low reproductive capacity, loss of suitable habitat or over-kill, now limited in numbers to few isolated populations.
TKN	- Total Kjeldahl Nitrogen. A measure of the ammonia and organic nitrogen, but does not include nitrite and nitrate nitrogen.
Tombolo	- A sand or gravel bar connected from shore to an island or off-shore structure.
Topography	- The configuration of the landscape including its relief, the position of its natural and man-made features.
Trophic	- Food chain relationships in an ecosystem.
Turbidity	- A cloudy condition in water due to the suspension of silt or finely divided organic matter.
Visual Vulnerability	- The sensitivity of the landscape to accommodate a given use (e.g., a disruption of natural landscape features).
Volatile Solids (Total)	- A measure of the organic material that could decompose and thus exert an oxygen demand on a body of water.
Wave	- A ridge, deformation, or undulation of the surface of a liquid.
Wetland	- Habitats characterized by aquatic or semi-aquatic plants that are permanently wet, or intermittently water covered.
Zinc	- Zinc (Zn) is a heavy metal which in trace quantities is essential to life, but which in greater quantities may be toxic to life.
Zooplankton	- Animal microorganisms living unattached in the water.





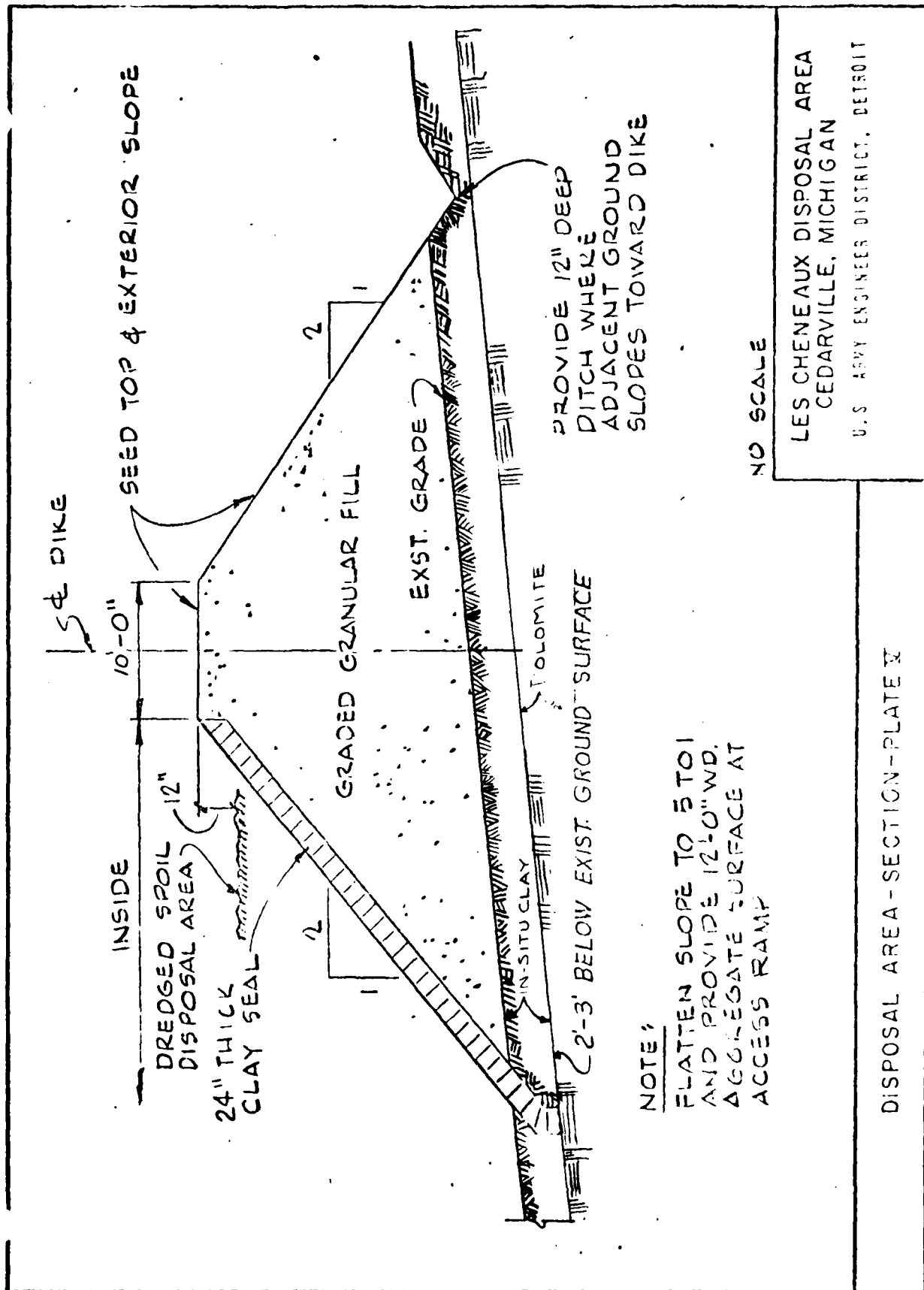
NOTE:

TOP OF CORNERS
OF DIKED AREA ARE TO BE
MAINT. AT 5 FEET ABOVE EXIST.
GROUND ELEVATION.



LES CHENEUX DISPOSAL AREA
CEDARVILLE, MICHIGAN
U.S. ARMY ENGINEER DISTRICT, DETROIT

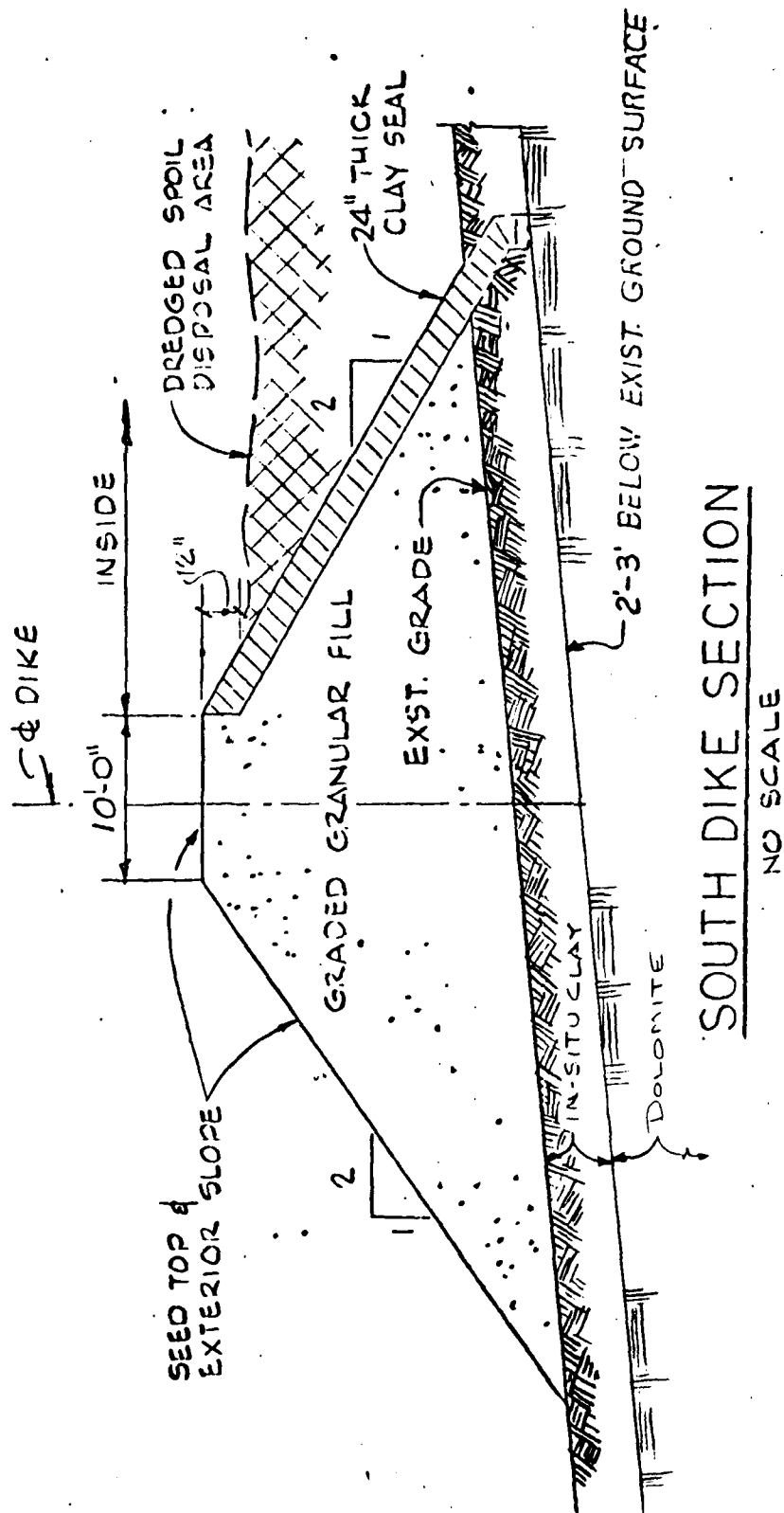
DISPOSAL AREA - PLAN - PLATE IV



NO SCALE

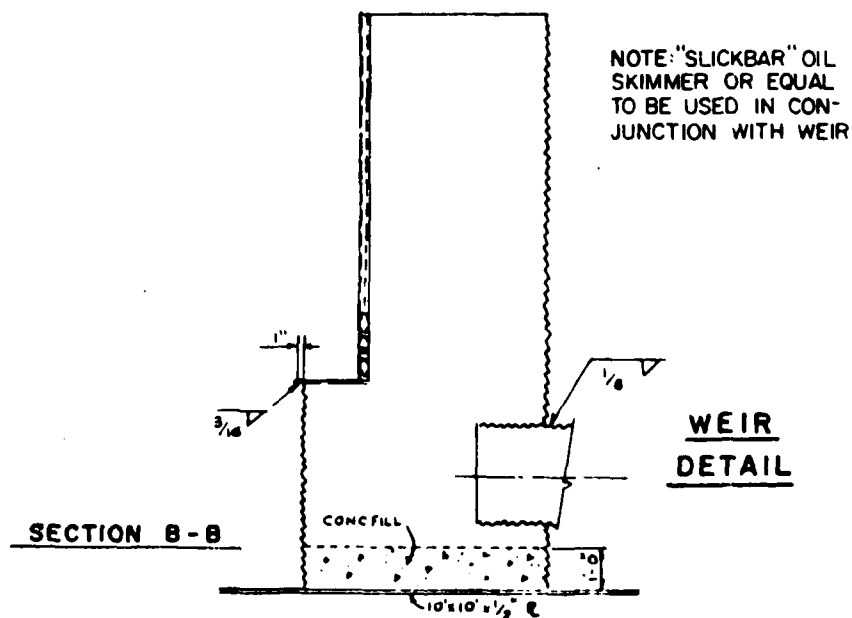
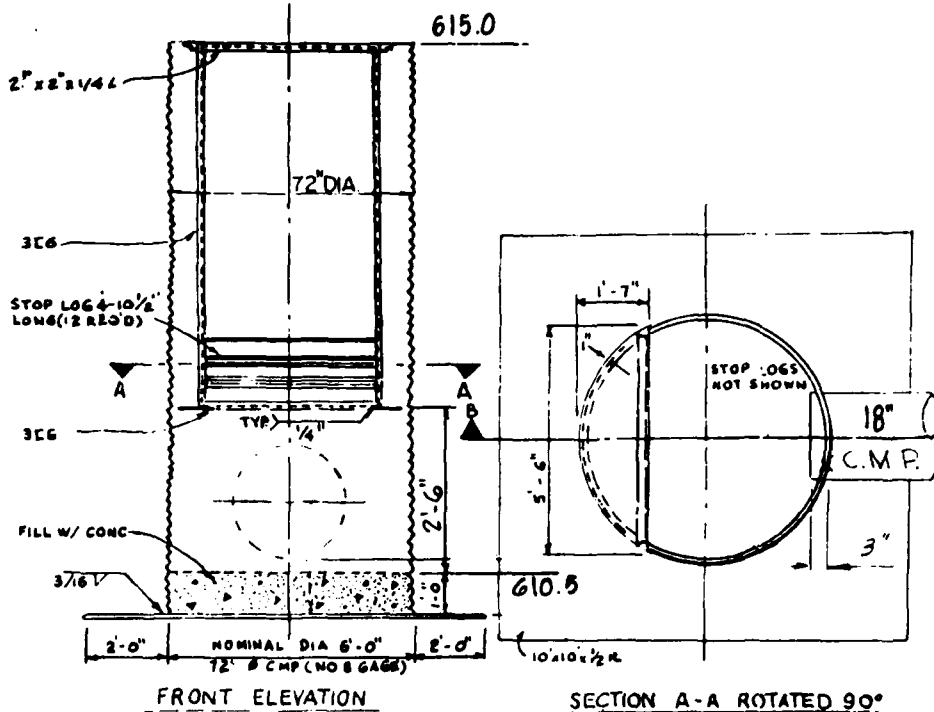
LES CHENE AUX DISPOSAL AREA
CEDARVILLE, MICHIGAN
U.S. ARMY ENGINEER DISTRICT, DETROIT

DISPOSAL AREA - SECTION - PLATE X



LES CHENEAX DISPOSAL AREA
CEDARVILLE, MICHIGAN
U.S. ARMY ENGINEER DISTRICT, DETROIT

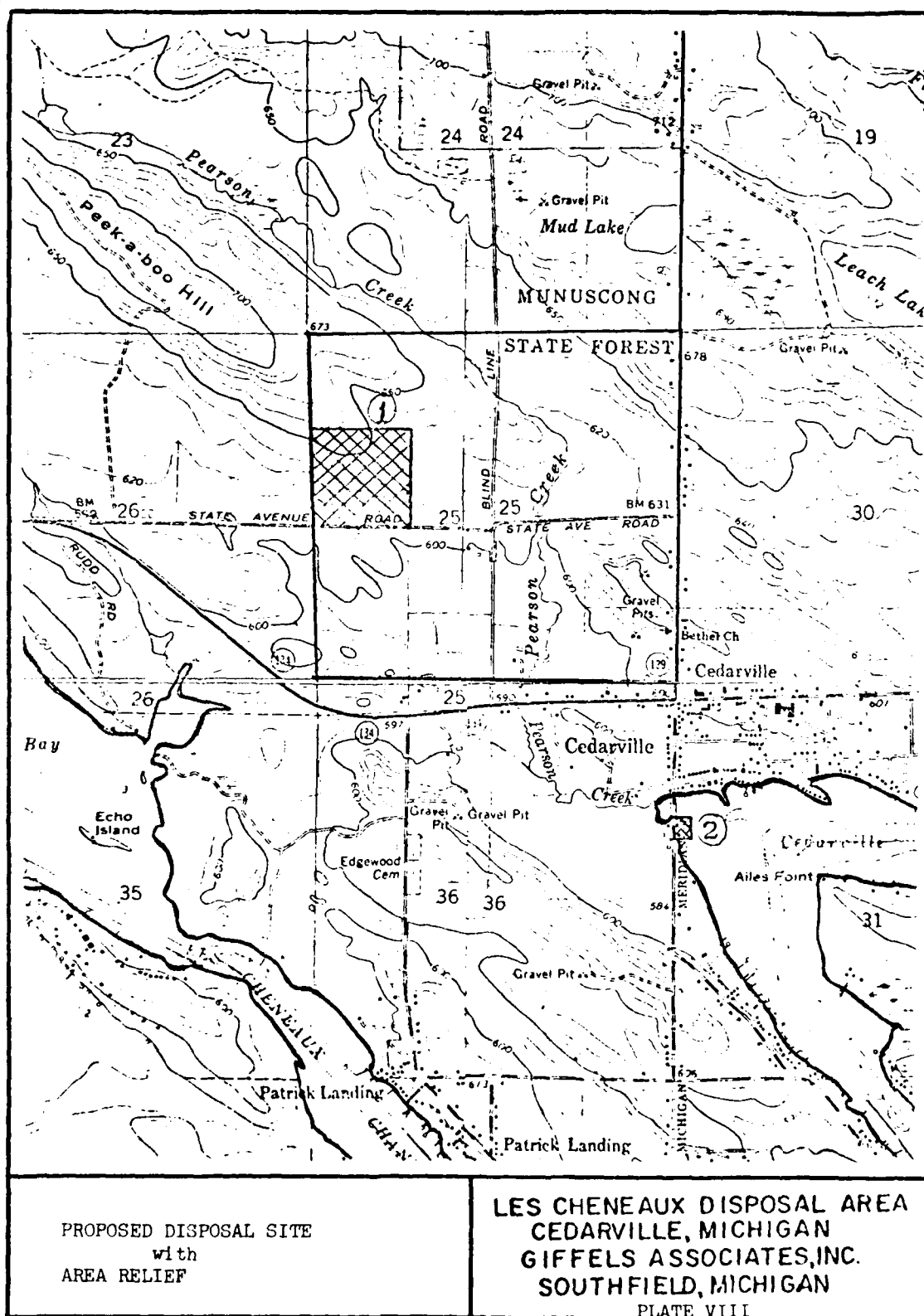
DISPOSAL AREA - SECTION - PLATE VI



NO SCALE

LES CHENEUX DISPOSAL AREA
CEDARVILLE, MICHIGAN
GIFFELS ASSOCIATES, INC.
SOUTHFIELD, MICHIGAN

OUTLET STRUCTURE - PLATE VII



APPENDIX 1

WATER AND SEDIMENT QUALITY DATA

Bottom Sediment Analysis
Les Cheneaux Islands, 1973
Report on Degree of Pollution of Bottom Sediments
Sampled October 26-27, 1976
US EPA Region V
Great Lakes Surveillance Branch

MICHIGAN DISTRICT OFFICE
 1973 SEDIMENT SAMPLING STATIONS
 LES CHENEUX ISLANDS

ENVIRONMENTAL PROTECTION AGENCY
 GROSSE ILE, MICHIGAN

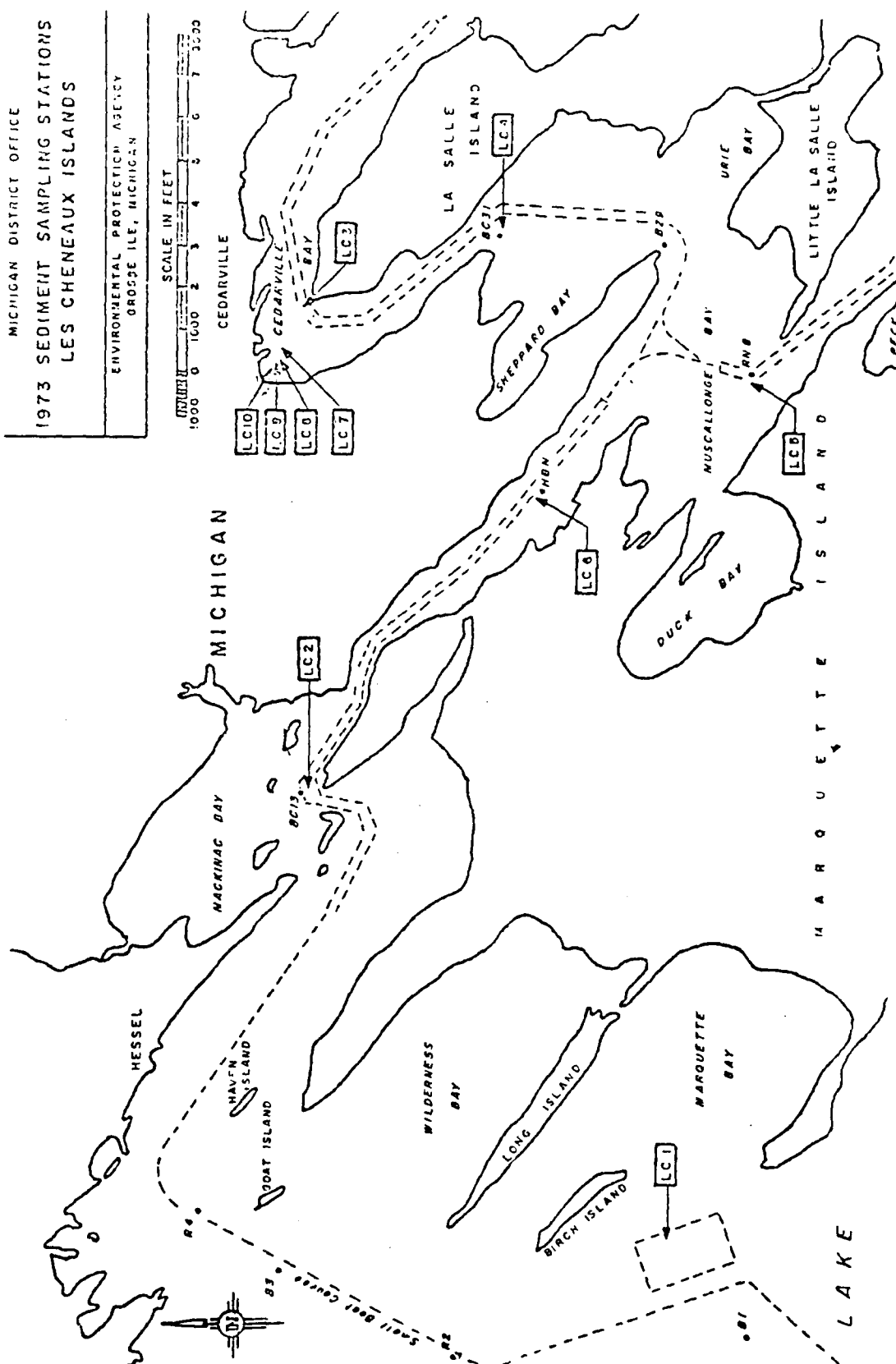


TABLE 2
Bottom Sediment Sample Analysis
Les Cheneaux Islands
August 1, 1973

KOODO-IPA

13

Station No.	Depth (ft.)	Lab. No.	Sediment Description					Temp. °C
			Color	Odor	Oil	Percent Composition		
LC-1	56	74-4079,	gray-brown	-	no	ooze-95, pebbles-5	13.0	
LC-2	20	74-4080	gray-brown	-	no	ooze-90, clay-5, sand-5	18.0	
LC-3	10	74-4081	gray	-	yes	ooze-50, mud-50	18.0	
LC-4	15	74-4082	gray	-	no	ooze-80, weeds-20	18.5	
LC-5	15	74-4083	gray-brown	-	-	ooze-90, weeds-10	16.5	
LC-6	12	74-4084	gray-brown	-	no	ooze-90, weeds-10	18.5	
LC-7	10	74-4085	gray	-	no	weeds-70, ooze-15, clay-10, sand-5	19.0	
LC-8	8	74-4086	gray-brown	-	-	weeds-70, clay-15, sand-10, ooze-5	19.0	
LC-9	6	74-4087	gray	-	no	ooze-50, clay-30, weeds-20	17.0	
LC-10	6	74-4088	black-brown	-	yes	ooze-98, weeds-2	16.5	

TABLE 2 (Cont'd)
Bottom Sediment Sample Analysis
Les Cheneaux Islands

WCO-

Station No.	Solids (percent)		COD (mg/kg)		Phenol (mg/kg)		Tot. Kjeldahl Nitrogen (mg/kg)		Total Phos. (mg/kg)		Oil & G. (mg/l)
	Total	Tot. Vol.	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	
LC-1	46.3	10.7	63700		.21		2730		396		2
LC-2	50.8	6.5	68400		.13		2850		222		1
LC-3	48.3	9.3	93800		.20		3630		335		
LC-4	42.8	10.2	99500		.98		4100		147		1
LC-5	41.4	8.3	104000		.47		3870		323		2
LC-6	31.6	17.0	192000		.41		7600		579		5
LC-7	40.3	8.8	99400		1.5		3520		367		4
LC-8	48.2	5.8	67300		1.67		2560		219		3
LC-9	56.7	4.6	46300		.17		1740		248		4
LC-10	26.3	22.1	305000		.74		7270		429		17
Concentration Limits		6.0	50000				1000		500		15

TABLE 2 (Cont'd)
Bottom Sediment Sample Analysis
Les Cheneaux Islands

Station No.	Total Iron (mg/kg)		Lead (mg/kg)		Cyanide (mg/kg)		Zinc (mg/kg)		Barium (mg/kg)	
	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B
LC-1		4330		10.20		<.01		24.70		60
LC-2		3000		10.00		.44		16.70		<30
LC-3		3850		3.80		<.01		12.05		<30
LC-4		2950		9.80		.43		17.50		<30
LC-5		3010		10.20		.29		19.25		110
LC-6		3450		10.20		.22		20.10		<30
LC-7		2450		4.40		.09		12.40		<30
LC-8		2290		6.20		.17		8.67		<30
LC-9		3550		9.20		<.01		17.90		<30
LC-10		2550		17.20		.29		28.00		<30
Concentration Limit		10000		50				50		

CORPS OF ENGINEERS DETROIT MI DETROIT DISTRICT F/G 13/2
 CONFINED DISPOSAL FACILITY AND MAINTENANCE DREDGING OF THE LES --ETC(U)
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F/G 13/2

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MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS-1963-A

CRITERIA FOR DETERMINING ACCEPTABILITY OF DREDGED SPOIL DISPOSAL TO THE NATION'S WATERS

Use of Criteria

These criteria were developed as guidelines for FWQA evaluation of proposals and applications to dredge sediments from fresh and saline waters.

Criteria

The decision whether to oppose plans for disposal of dredged spoil in United States waters must be made on a case-by-case basis after considering all appropriate factors; including the following:

- (a) Volume of dredged material.
- (b) Existing and potential quality and use of the water in the disposal area.
- (c) Other conditions at the disposal site such as depth and currents.
- (d) Time of year of disposal (in relation to fish migration and spawning, etc.).
- (e) Method of disposal and alternatives.
- (f) Physical, chemical, and biological characteristics of the dredged material.
- (g) Likely recurrence and total number of disposal requests in a receiving water area.
- (h) Predicted long and short term effects on receiving water quality. When concentrations, in sediments, of one or more of the following pollution parameters exceed the limits expressed below, the sediment will be considered polluted in all cases and, therefore, unacceptable for open water disposal.

Sediments in Fresh and Marine Waters	Conc. % (dry wt. basis)
*Volatile Solids	6.0
Chemical Oxygen Demand (C.O.D.)	5.0
Total Kjeldahl Nitrogen	0.10
Oil-Grease	0.15
Mercury	0.0001
Lead	0.005
Zinc	0.005

*When analyzing sediments dredged from marine waters, the following correlation between volatile solids and C.O.D. should be made:

$$T.V.S.\% \text{ (dry)} = 1.32 + 0.93(C.O.D.X)$$

If the results show a significant deviation from this equation, additional samples should be analyzed to insure reliable measurements.

The volatile solids and C.O.D. analyses should be made first. If the maximum limits are exceeded the sample can be characterized as polluted and the additional parameters would not have to be investigated.

Dredged sediment having concentrations of constituents less than the limits stated above will not be automatically considered acceptable for disposal. A judgement must be made on a case-by-case basis after considering the factors listed in (a) through (h) above.

In addition to the analyses required to determine compliance with the stated numerical criteria, the following additional tests are recommended where appropriate and pertinent:

Total Phosphorus	Sulfides
Total Organic Carbon (T.O.C.)	Trace Metals (iron, cadmium, copper, chromium, arsenic, and nickel)
Immediate Oxygen Demand (I.O.D.)	Pesticides
Settleability	Bioassay

The first four analyses would be considered desirable in almost all instances. They may be added to the mandatory list when sufficient experience with their interpretation is gained. For example, as experience is gained, the T.O.C. test may prove to be a valid substitute for the volatile solids and C.O.D. analyses. Tests for trace metals and pesticides should be made where significant concentrations of these materials are expected from known waste discharges.

All analyses and techniques for sample collection, preservation, and preparation shall be in accord with a current FWQA analytical manual on sediments.

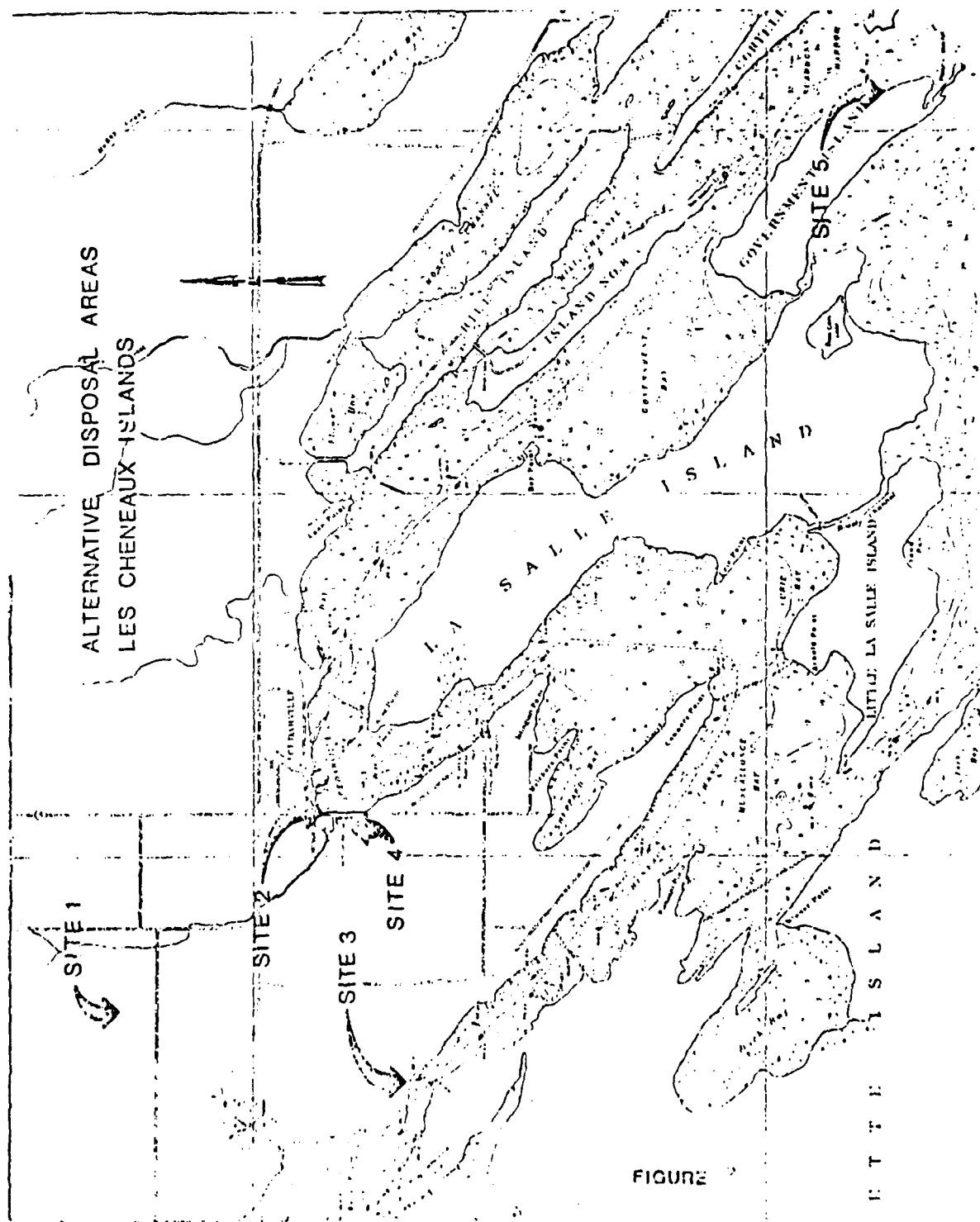


TABLE 1

1973 EPA SEDIMENT DATA
(mg/kg Dry Weight)

PARAMETERS	STATIONS										EPA Criteria
	1	2	3	4	5	6	7	8	9	10	
%Total Solids	46.3	50.8	48.3	42.8	41.4	31.6	40.3	48.2	56.7	26.3	-
%TotVol.Solids	10.7	6.5	9.3	10.2	8.3	17.0	8.8	5.8	4.6	22.1	5.0
Chem.Oxy.Demand	63,700	68,400	93,800	99,500	104,000	192,000	99,400	67,300	45,800	305,000	50,000
Tot.Xfel.Nit.	2,730	2,850	3,630	4,100	3,870	7,600	3,520	2,560	1,740	7,270	1,000
Oil and Grease	249	108	973	199	290	585	472	311	476	1,750	1,500
Mercury	.772	.366	.443	.769	.517	.766	.601	.417	.404	.762	1.0
Lead	10.2	10.0	3.8	9.8	10.2	10.2	4.4	6.2	9.2	17.2	50
Zinc	24.70	16.70	12.05	17.50	19.25	20.10	12.40	8.67	17.90	28.00	50
Tot. Phosphorus	396	222	335	147	333	579	367	219	248	429	500
Phenol	.21	.13	.20	.95	.47	.41	1.5	1.67	.17	.74	-
Iron	4,330	3,000	3,850	2,950	3,010	3,450	2,450	2,290	3,550	2,550	-
Arsenic	4.67	2.02	1.10	1.40	3.60	4.57	1.81	.94	1.50	2.98	-
Cadmium	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	-
Chromium	31.25	32.55	24.45	23.35	26.00	26.80	12.30	26.65	21.55	28.95	-
Cobalt	2.4	1.00	.40	.30	2.60	.80	.40	2.00	1.90	1.40	-
Copper	6.6	6.00	3.90	4.50	6.50	7.70	3.35	4.35	5.55	4.15	-

LES CHENEAX ISLAND CHANNELS, MICHIGAN

REPORT ON THE DEGREE OF POLLUTION OF
BOTTOM SEDIMENTS

SAMPLED: OCTOBER 26 and 27, 1976

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION V
GREAT LAKES SURVEILLANCE BRANCH

DISCUSSION OF RESULTS

Sediments consisted of fine silt and clay size material at sites LCX76-1, 7, and 8. The remaining sites were a mixture of sand and silt size material (Table II). Benthic organisms were found in high numbers at all sites (Tables I and V). Aquatic weeds and organic debris were found in virtually all samples.

The bulk sediment chemistry analysis results (Table III) show moderate organic and metals enrichment at sites LCX76-1, 2, 3, 5, 6, and 7. Sites LCX76-5 and 6 were the most organically enriched. Sites LCX76-3, 4, 7, and 8 (the open water disposal site) were the least enriched. The disposal site had an elevated arsenic level.

The elutriate test results (Table IV) show ammonia was released from all samples. Arsenic was not released from the disposal site sample. Overall, sample LCX76-4 showed the highest releases, while sample LCX76-2 had the lowest releases.

The macroinvertebrate data (Table V) show high species diversity with some pollution intolerant taxa found at all sites.

The bulk sediment PCB and pesticides analysis of the samples from LCX76-1 and 6 show all measured organic compounds were below the laboratory's quantifiable detection limits.

Based upon the data obtained, the pollutional classifications are as shown on the location map. Sediments from the areas classified as unpolluted are suitable for open lake disposal. Sediments from the areas classified unpolluted/moderately polluted and moderately polluted are suitable for restricted open lake disposal. The restrictions being:

- 1) minimize overdredging, dredge the moderately polluted material first,
- 2) dispose of that material in as small an area as possible,
- 3) dredge the unpolluted/moderately polluted material next, and cover over the previously deposited moderately polluted material,
- 4) finally, cover over with material dredged from the areas classified as unpolluted.

A sediment survey of the project was conducted on 1 August 1973 and found most of the project to be heavily polluted. Thus, the present survey results indicate a substantial improvement in sediment quality in the interim.

TABLE I
FIELD OBSERVATIONS

HARBOR: Les Cheneaux Island Channels, Michigan

SAMPLED: October 26 and 27, 1976

STATION NO.	DEPTH (ft.)	OBSERVATIONS			GENERAL REMARKS
		COLOR	SAMPLE DESCRIPTION	ODOR	
LCX76-1	10	Grey	Silt and ooze	-	None
LCX76-2	9	Grey	Silt and ooze	Earthy	None
LCX76-3	9	Grey	Silt and mud, some clay and sand	None	None
LCX76-4	10	Brown	Fine sand, some red and grey clay	None	None
LCX76-5	8	Grey	Silt and ooze	-	None
LCX76-5 replicate	8	Grey	Silt and ooze	-	None
LCX76-6	8	Grey-black	Mud and silt	-	None
LCX76-7	7	Grey-black	Mud and silt, some clay	None	None
LCX76-8	55	Brown	Sand, some silt	None	None

TABLE II
SIEVE ANALYSIS RESULTS

HARBOR: Les Cheneaux Island Channels, Michigan

SAMPLED: October 26 and 27, 1976

SIEVE NO. AND DESCRIPTION	<u>LCX76-1</u>	<u>LCX76-2</u>	<u>LCX76-3</u>	<u>LCX76-4</u>	<u>LCX76-5</u>	<u>LCX76-5 replicate</u>	<u>LCX76-6</u>	<u>LCX76-7</u>	<u>LCX76-8</u>
Retained on #10 Medium Gravel and Larger	<1	6	2	3	2	2	5	2	<1
Retained on #20 Fine Gravel	<1	7	<1	<1	2	<1	<1	<1	2
Retained on #60 Medium and Coarse Sand	10	32	22	76	11	10	20	5	9
Retained on #200 Fine Sand	12	12	30	15	19	25	10	18	22
Passing #200 Silts and Clays	78	43	46	6	66	63	65	75	67

TABLE III
BULK SEDIMENT ANALYSIS RESULTS

HARBOR: Les Cheneaux Island Channels, Michigan

SAMPLED: October 26 and 27, 1976

PARAMETER	LCX76-1	LCX76-2	LCX76-3	LCX76-4	LCX76-5	LCX76-5 replicate	LCX76-6	LCX76-7	LCX76-8
Total Solids %	31.5	14.7	41.4	61.3	34.4	35.8	23.7	44.6	61.2
Volatile Solids %	9.07	6.45	2.26	1.18	8.57	7.66	13.5	4.99	1.12
Chem. Oxy. Demand	59,000	42,000	48,000	12,000	119,000	92,000	102,000	72,000	17,000
T. Kjeld. Nitrogen	1,900	1,200	1,600	420	3,500	3,100	1,000	2,600	1,000
Oil-Grease	<500	1,200	<500	<500	<500	<500	<500	<500	<500
Mercury	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Lead	31	42	20	15	36	8	64	25	<5
Zinc	80	94	59	17	67	69	95	48	53
T. Phosphorous	82	270	200	100	310	250	170	250	320
Ammonia Nitrogen	67	30	55	26	65	62	60	64	30
Manganese	191	203	138	49	143	124	210	121	378
Nickel	45	45	35	<10	20	20	35	25	35
Arsenic	4	7	4	2	5	3	6	4	10
Cadmium	<1	1.2	<1	<1	<1	<1	<1	<1	<1
Chromium	33	41	22	5	31	28	41	22	43
Copper	23	27	15	3	17	16	24	12	20
Iron	16,000	19,000	11,000	2,800	14,000	13,000	17,000	10,000	20,000

All values mg/kg dry weight unless otherwise noted.

HARBOR: Les Cheneaux Island Channels, Michigan
 SAMPLED: October 26 and 27, 1976

TABLE IV
 ELUTRIATE TEST RESULTS

PARAMETER	(Units) (mg/l)	ELUTRIATE WATER		DISPOSAL SITE WATER	ELUTRIATE WATER USING SEDIMENTS AT EACH STATION									
		RUN BLANK	Without SEDIMENT		LCX76-1	LCX76-2	LCX76-3	LCX76-4	LCX76-5	LCX76-5 replicate	LCX76-6	LCX76-7	LCX76-8	
COD		3	11	13	33	13	13	54	17	18	14	20	21	
TOC	"	2	4	5	10	6	7	18	7	6	5	7	6	
TKN	"	0.30	0.57	0.47	0.81	0.54	0.85	1.48	0.53	0.63	0.84	0.92	0.90	
Ammonia-N	"	<0.03	<0.03	<0.03	0.20	0.10	0.16	0.68	0.07	0.07	0.40	0.40	0.08	
Nitrate-Nitrite-N	"	<0.03	0.12	0.24	0.12	0.14	0.13	0.12	0.13	0.11	0.11	0.11	0.12	
Total P	"	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	0.02	
Cyanide	"	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.010	<0.005	
Phenols	(ug/l)	<5	<5	7	<5	<5	<5	9	<5	<5	<5	<5	<5	
Arsenic	"	<2	<2	<2	<2	<2	<2	2	<2	<2	<2	<2	<2	
Cadmium	"	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Chromium	"	<24	<24	<24	<24	<24	<24	<24	<24	<24	<24	<24	<24	
Copper	"	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	
Iron	"	<20	<20	<20	<20	<20	27	70	71	62	27	21	<20	
Lead	"	<60	<60	<60	<60	<60	<60	<60	<60	<60	<60	<60	<60	
Magnesium	(mg/l)	<0.1	7.6	6.9	8.6	8.4	8.1	8.3	7.7	7.7	7.1	8.1	8.1	
Manganese	(ug/l)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	179	
Mercury	"	<0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	
Nickel	"	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	
Zinc	"	<25	<25	46	<25	<25	<25	<25	<25	<25	<25	<25	<25	
Aluminum	"	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	

TABLE V
MACROINVERTEBRATES

HARBOR: Les Cheneaux Island Channels, Michigan

SAMPLED: October 26 and 27, 1976

TAXA	NUMBER OF ORGANISMS FOR EACH TAXA							
	LCX76-1	LCX76-2	LCX76-3	LCX76-4	LCX76-5	LCX76-6	LCX76-7	LCX76-8
DIPTERA								
<i>Clinotanytus</i> sp.	24		4		7	1		
<i>Procladius</i> sp.	156	240	244	96	47	8	12	4
<i>Dicrotendipes</i> sp.	60	12	64			1		
<i>Tribelos</i> sp.	28	20	8		7	3		
<i>Polypedilum</i> sp.	12				16	7	52	
<i>Chironomus</i> sp.	4	8		4	1			
<i>Tanytarsus</i> sp.	20	16		96				
<i>Hemerodromia</i>	1							
<i>Coelotanytus</i> sp.		4				3		
<i>Ablabesmyia rampha</i>		4			5	1		
<i>Polypedilum</i> sp.		196	8					1
<i>Cricotopus</i> sp.		4						6
<i>Endochironomus</i> sp.			40			4		
<i>Tanytarsini</i> tribe			84					
<i>Psectrocladius</i> sp.			4					
<i>Cladotanytarsus</i> sp.				4				
<i>Monodiamesa</i> sp.				24		1		2
<i>Heterotrissocladius</i> sp.				76		1		33
<i>Rheotanytarsus</i> sp.				20				
<i>Pseudodiamesa</i> sp.				4				
<i>Cryptochironomus</i> sp.					1	2	20	
<i>Microtendipes</i> sp.						2		8
<i>Glyptotendipes</i> sp.						1		
<i>Micropectra</i> sp.						1		
<i>Hemerodromia seguyi</i>						1		7
<i>Paracladopelma</i> sp.								1
<i>Psectrotanytus</i> sp.								

TABLE V-Continued
MACROINVERTEBRATES

HARBOR: Les Cheneaux Island Channels, Michigan

SAMPLED: October 26 and 27, 1976

<u>TAXA</u>	<u>LCX76-1</u>	<u>LCX76-2</u>	<u>LCX76-3</u>	<u>LCX76-4</u>	<u>LCX76-5</u>	<u>LCX76-6</u>	<u>LCX76-7</u>	<u>LCX76-8</u>
TRICHOPTERA								
<i>Phyllocentropus</i> sp.	9	4				4		
<i>Triacnoides aba</i>	1							
<i>Agapetus</i> sp.			2					1
<i>Triacnoides injusta</i>						1		
EPHEMEROPTERA								
<i>Ephemera</i> sp.	2							
<i>Hexagenia limbata</i>	16	4	22	13			4	
<i>Hexagenia bilineata</i>	2							
<i>Ephemera simulans</i>				11				
<i>Hexagenia</i> sp.						2		
MEGALOPTERA								
<i>Sialis</i> sp.	33	16	20	4	7	2		
OLIGOCHAETA								
<i>Limnodrilus</i> sp.	15	28	14	52		8		1
<i>Tubifex</i> sp.		4	8					5
<i>Peloscoides</i> sp.				80				
<i>Stylodrilus</i> sp.								108
HIRUDINEA								
<i>Glossiphonia complanata</i>			2					
<i>Helobdella stagnalis</i>				19			4	

TABLE V-Continued
MACROINVERTEBRATES

HARBOR: Les Cheneaux Island Channels, Michigan

SAMPLED: October 26 and 27, 1976

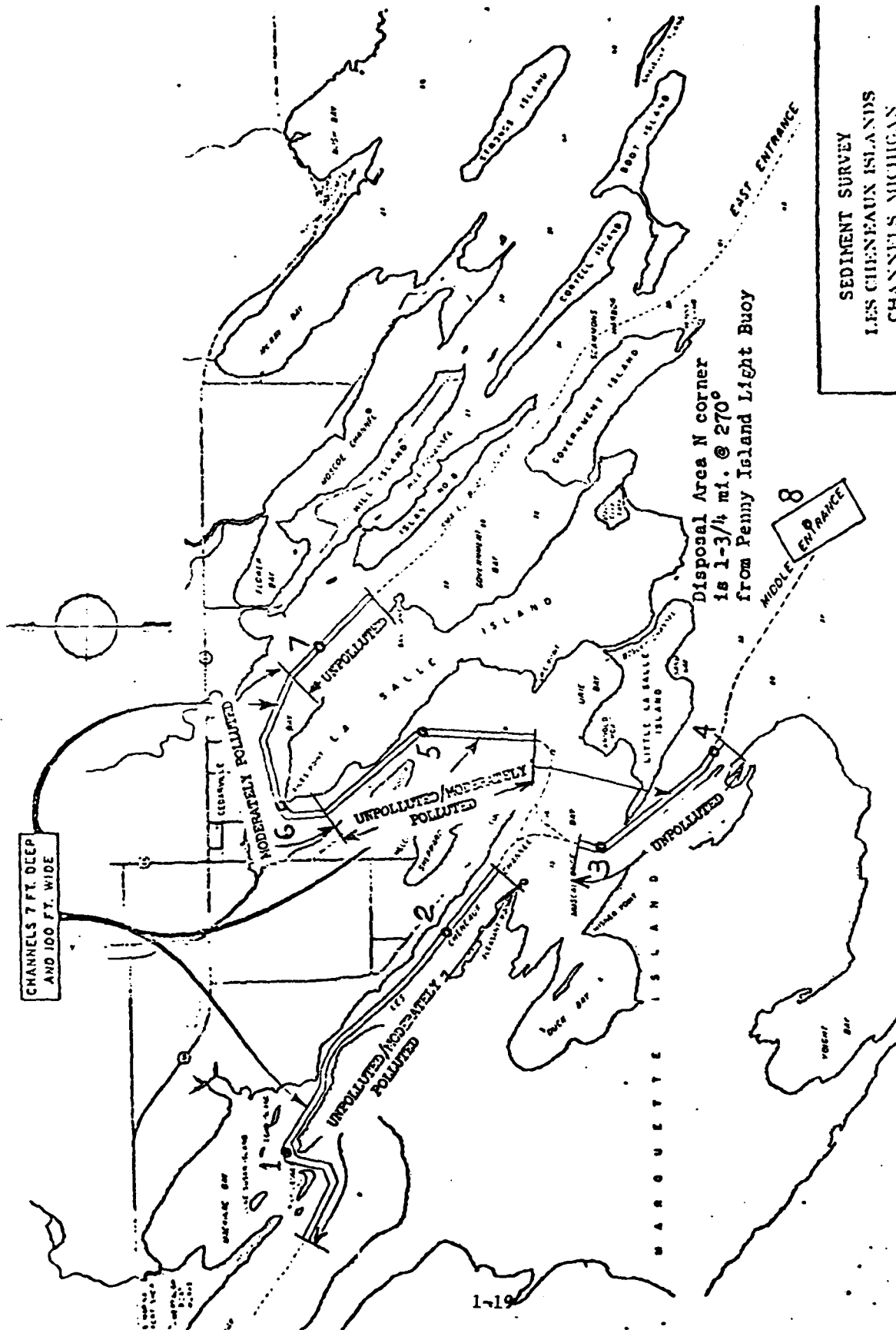
TAXA	NUMBER OF ORGANISMS FOR EACH TAXA							
	<u>LCX76-1</u>	<u>LCX76-2</u>	<u>LCX76-3</u>	<u>LCX76-4</u>	<u>LCX76-5</u>	<u>LCX76-6</u>	<u>LCX76-7</u>	<u>LCX76-8</u>
ISOPODA								
<i>Asellus</i> sp.		4	8			30	20	3
<i>Lineus lineatus</i>			26	7		3	100	
<i>Asellus racovitzai</i>				57	2			
<i>Lineus fontinalis</i>						1		
<i>Lineus</i> sp.						26		
<i>Asellus brevicaudus</i>						4		
AMPHIPODA								
<i>Gammarus fasciatus</i>	2		8	7	2	29	4	
<i>Hyalella azteca</i>	6	28	14	1	1		36	
<i>Pontoporeia affinis</i>				123				540
DECAPODA								
<i>Cambarinae</i>					1			
PELECYPODA								
<i>Pisidium dubium</i>	2							
<i>Pisidium henslowianum</i>	3							
<i>Pisidium ventricosum</i>	13							
<i>Pisidium casertanum</i>			72	29				
<i>Pisidium</i> sp.			2			1		
<i>Pisidium milium</i>				2			8	
<i>Sphaerium striatum</i>				1				
<i>Sphaerium simile</i>					1			
<i>Pisidium conventus</i>							8	
<i>Sphaerium rhomboidum</i>								1
<i>Sphaerium corneum</i>								22

TABLE V-Continued
MACROINVERTEBRATES

HARBOR: Les Cheneaux Island Channels, Michigan

SAMPLED: October 26 and 27, 1976

TAXA	NUMBER OF ORGANISMS FOR EACH TAXA							
	<u>LCX76-1</u>	<u>LCX76-2</u>	<u>LCX76-3</u>	<u>LCX76-4</u>	<u>LCX76-5</u>	<u>LCX76-6</u>	<u>LCX76-7</u>	<u>LCX76-8</u>
GASTROPODA								
<i>Valvata tricarinata</i>	48			4	5			1
<i>Lymnea humilis</i>	4			2				
<i>Amnicola limosa</i>	13	8			13	2		
<i>Physa</i> sp.	2							
<i>Gyraulus parvus</i>		4	2	2				
<i>Physa integra</i>			12					
<i>Valvata piscinalis</i>			10					
<i>Valvata lewisi</i>	1			1				
<i>Valvata sincera</i>	1			4			12	
<i>Physa elliptica</i>	8							
HYDRACARINA					1		4	
COPEPODA								
<i>Limnocalanus macrurus</i>								5
MYSIDACEA								
<i>Mysis oculata relicta</i>								1
Total No. of organisms	476	604	678	743	118	150	284	750
Total No. of taxa	24	18	23	27	17	28	13	19



LEGEND:
● LCX76 Sampling Sites

SEDIMENT SURVEY
LES CHENEVAUX ISLANDS
CHANNEL, MICHIGAN

U.S. ENVIRONMENTAL PROTECTION AGENCY
GREAT LAKES SURVEILLANCE BRANCH
CHICAGO ILLINOIS

The following ranges used to classify sediments from Great Lakes harbors are based on compilations of data from over 100 different harbors since 1967.

	<u>NONPOLLUTED</u>	<u>MODERATELY POLLUTED</u>	<u>HEAVILY POLLUTED</u>
Volatile Solids (%)	<5	5 - 8	>8
COD (mg/kg dry weight)	<40,000	40,000-80,000	>80,000
TKN " " "	<1,000	1,000-2,000	>2,000
Oil and Grease (Hexane Solubles) (mg/kg dry weight)	<1,000	1,000-2,000	>2,000
Lead (mg/kg dry weight)	<40	40-60	>60
Zinc " " "	<90	90-200	>200

The following supplementary ranges used to classify sediments from Great Lakes harbors have been developed to the point where they are usable but are still subject to modification by the addition of new data. These ranges are based on 260 samples from 34 harbors sampled during 1974 and 1975.

	<u>NONPOLLUTED</u>	<u>MODERATELY POLLUTED</u>	<u>HEAVILY POLLUTED</u>
Ammonia (mg/kg dry weight)	<75	75-200	>200
Cyanide " " "	<0.10	0.10-0.25	>0.25
Phosphorus " " "	<420	420-650	>650
Iron " " "	<17,000	17,000-25,000	>25,000
Nickel " " "	<20	20-50	>50
Manganese " " "	<300	300-500	>500
Arsenic " " "	<3	3-8	>8
Cadmium " " "	*	*	>6
Chromium " " "	<25	25-75	>75
Barium " " "	<20	20-60	>60
Copper " " "	<25	25-50	>50

*Lower limits not established

The guidelines stated below for mercury and PCB's are based upon the best available information and are subject to revision as new information becomes available.

Methylation of mercury at levels ≥ 1 mg/kg has been documented (1,2). Methyl mercury is directly available for bioaccumulation in the food chain.

Elevated PCB levels in large fish have been found in all of the Great Lakes. The accumulation pathways are not well understood. However, bioaccumulation of PCB's at levels ≥ 10 mg/kg in fathead minnows has been documented (3).

Because of the known bioaccumulation of these toxic compounds, a rigid limitation is used. If the guideline values are exceeded, the sediments are classified as polluted and unacceptable for open lake disposal no matter what the other data indicate.

POLLUTED

Mercury	≥ 1 mg/kg dry weight
Total PCB's	≥ 10 mg/kg dry weight

The pollutional classification of sediments with total PCB concentrations between 1.0 mg/kg and 10.0 mg/kg dry weight will be determined on a case-by-case basis.

APPENDIX 2

VEGETATION AND FAUNA DATA

List of the Common and Scientific
Names of the Flora and Fauna
Included in the Text of the EIS

Checklist of Birds in the Nearshore and Shoreline Wetlands
of the Les Cheneaux Islands, Mackinac County, Michigan

Table K-1. Status of Wildlife as of 1970,
Eastern Upper Peninsula, Michigan

Figure 1. Clark Township Harbor Improvement Project
Benthic Fauna, Les Cheneaux Islands Small Boat Channel
(EPA, Region 5, 1976)

LIST OF THE COMMON AND SCIENTIFIC
NAMES OF THE FLORA AND FAUNA
INCLUDED IN THE TEXT OF THE EIS.

The species are arranged within the various groups as they are first given in the text. Species observed during the field inventory reported for the project area are listed, unless otherwise (*) indicated.

Vascular Plants¹ -

White Spruce, *Picea glauca* (Moench) Voss
Black Spruce, *Picea mariana* (Mill) BSP
Balsam Fir, *Abies balsamea* (L.) Mill.
White Birch, *Betula papyrifera* Marsh
Trembling Aspen, *Populus tremuloides* Michx.
Northern White Cedar, *Thuja occidentalis* L.
Tamarack, *Larix laricina* (Du Roi) K. Koch
Red Maple, *Acer rubrum* L.
White Pine, *Pinus strobus* L.
Red Pine, *Pinus resinosa* Ait.
Sugar Maple, *Acer saccharum* Marsh
Yellow Birch, *Betula alleghaniensis* Britton
Basswood, *Tilia americana* L.
Black Cherry, *Prunus serotina* Ehrh.
Hemlock, *Tsuga canadensis* (L.) Carr.

Cat-tail, *Typha latifolia* L.
Hardstem Bulrush, *Scirpus acutus* Bigelow
Softstem Bulrush, *Scirpus validus* Vahl
Yellow Water Lily, *Nuphar advena* Ait.
Buffaloberry, *Shepherdia canadensis* (L.) Nutt

Alternate-leaved Dogwood, *Cornus alternifolia* L.
Bush Honeysuckle, *Diervilla lonicera* Mill.
Large-leaf Aster, *Aster macrophyllus* L.
Shinleaf, *Pyrola asarifolia* Michx.
Sweet Coltsfoot, *Petasites sagittatus* (Pursh) Gray
Bunchberry, *Cornus canadensis* L.

Mosses -

Rhytidiadelphus triquetrus (Hedw.) Warnst.
Hylocomium splendens (Hedw.) BSG

Lichens -

Peltigera (including *P. aphthosa*, *P. canina*,
P. horizontalis, and *P. polydactyla*)

Fish² -

Northern Pike, *Esox lucius* L.
Largemouth Bass, *Micropterus salmoides* Lacepede
Smallmouth Bass, *Micropterus dolomieu* Lacepede
Rock Bass, *Ambloplites rupestris* Rafinesque
Bluegill, *Lepomis macrochirus* Rafinesque
Pumpkinseed, *Lepomis gibbosus* L.

Macro-Invertebrates -

Aquatic Sow Bugs, Isopoda
Scuds, Amphipoda - *Gammarus fasciatus*
Aquatic Earthworms, Oligochaeta - *Limnodrilus* sp.
Caddis flies, Trichoptera

Alderflies, Megaloptera - Sialida
Mayflies, Ephemeroptera
Bilvalve Mollusk, Pelecypoda

Mammals³ -

Snowshoe Hare, *Lepus americanus* Erxleben
White-Tailed Deer, *Odocoileus virginianus* Miller
Short-tailed Shrew, *Blarina brevicauda* Bole and Moulthrop
Raccoon, *Procyon lotor* L.
Skunk, *Mephitis mephitis* Schreber
Porcupine, *Erethizon dorsatum* L.

¹ Vascular plant nomenclature according to Gleason, H.A. and A. Cronquist. 1963. Manual of Vascular Plants of Northeastern United States and Canada. D. Van Nostrand Co., Inc., Princeton, N.J. viii + 810 p.

² Fish nomenclature follows Scott, W.B. and E.J. Crossman. 1973. Freshwater Fishes of Canada. Fisheries Res. Board, Canada. ix + 966 p.

³ Mammal scientific names follow Burt, W.H. 1954. The Mammals of Michigan. The Univ. Mich. Press, Ann Arbor. 287 p.

Checklist of Birds¹ in the Nearshore and Shoreline Wetlands
of the Les Cheneaux Islands
Mackinac County, Michigan

+ Observed in field, 27 - 28 June 1977

* Nesting in Coastal Wetlands

- + * Common Loon (with juvenile), *Gavia immer*
- + * Pied-billed Grebe (with 3 juveniles), *Podilymbus podiceps*
- * Red-necked Grebe², *Podiceps grisegena*
- Double-crested Cormorant², *Phalacrocorax auritus*
- + * Great Blue Heron², *Ardea herodias*
- + * Black-crowned Night Heron², *Nycticorax nycticorax*
- + * Least Bittern², *Ixobrychus exilis*
- + * American Bittern², *Botaurus lentiginosus*
- Canada Goose², *Branta canadensis*
- Snow Goose², *Chen hyperborea*
- + * Mallard (with brood of 5), *Anas platyrhynchos*
- + * Black Duck (with brood of 8), *Anas rubripes*
- + * Pintail (with brood of 4), *Anas acuta*
- * Blue-winged Teal², *Anas discors*
- * Wood Duck², *Aix sponsa*
- Baldpate², *Mareca americana*
- Shoveller², *Spatula clypeata*
- Ring-necked Duck², *Aythya collaris*
- Greater Scaup², *Aythya marila*
- Lesser Scaup², *Aythya affinis*
- Common Goldeneye², *Bucephala clangula*
- Ruddy Duck², *Oxyura jamaicensis*
- * Hooded Merganser², *Lophodytes cucullatus*
- + * Common Merganser (with brood of 12), *Mergus merganser*
- + * Red-breasted Merganser², *Mergus serrator*

- * Bald Eagle², *Haliaeetus leucocephalus*
 - Osprey², *Pandion haliaetus*
 - Sandhill Crane², *Grus canadensis*
 - * Sora Rail², *Porzana carolina*
 - * Yellow Rail², *Coturnicops noveboracensis*
 - + * American Coot (with 2 chicks), *Fulica americana*
 - + Semipalmated Plover, *Charadrius semipalmatus*
 - + * Killdeer (with young), *Charadrius vociferus*
 - + * Spotted Sandpiper (with young), *Actitis macularia*
 - + Least Sandpiper, *Erolia minutilla*
 - + * Herring Gull², *Larus argentatus*
 - + * Ring-billed Gull², *Larus delawarensis*
 - + Common Tern, *Sterna hirundo*
-
- + Black Tern, *Chlidonias niger*
 - + * Belted Kingfisher², *Megasceryle alcyon*
 - + * Eastern Kingbird, *Tyrannus tyrannus*
 - + * Least Flycatcher², *Empidonax minimus*
 - * Alder Flycatcher², *Empidonax traillii*
 - + Eastern Wood Pewee, *Contopus virens*
 - + * Tree Swallow² (hunting over water), *Iridoprocne bicolor*
 - + * Bank Swallow² (hunting over water), *Riparia riparia*
 - + * Rough-winged Swallow² (hunting over water), *Stelgidopteryx ruficollis*
 - + * Cliff Swallow² (hunting over water), *Petrochelidon pyrrhonota*
 - + * Purple Martin² (hunting over water), *Progne subis*
 - + Northern Raven, *Corvus corax*
 - + American Crow, *Corvus brachyrhynchos*
 - + * Sedge (Short-billed Marsh) Wren, *Cistothorus platensis*
 - + Catbird, *Dumetella carolinensis*
 - + * Brown Thrasher², *Toxostoma rufum*

- + * Eastern Bluebird², *Sialia sialis*
- + Black-and-white Warbler, *Mniotilta varia*
- + * Yellow-throated Warbler², *Geothlypis trichas*
- + * Northern Waterthrush², *Seiurus noveboracensis*
- + * Red-winged Blackbird² (with young), *Agelaius phoeniceus*
- + Common Grackle, *Quiscalus quiscula*
- + Brown-headed Cowbird, *Molothrus ater*
- + * Rose-breasted Grosbeak², *Pheucticus ludovicianus*
- + * Swamp Sparrow (nest), *Melospiza georgiana*

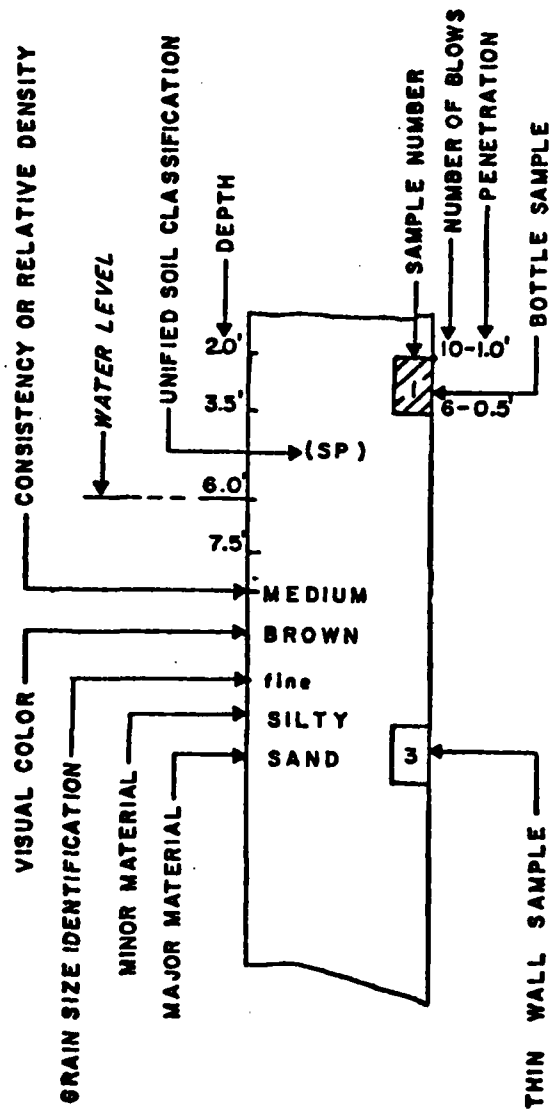
¹ Names conform to the 1977 "Checklist of Michigan Birds", compiled by V. Janson and L. Ryel (Michigan DNR).

² From the records of Mr. and Mrs. Harry Harris, Route #1, Box 225, Cedarville, Michigan 49719; and Mrs. Faith P. Hadley, Route #1, Box 562, Cedarville, Michigan 49719.

APPENDIX 3

SOIL DATA

BORING LOG LEGEND



RELATIVE DENSITY & CONSISTENCY TABLE				
SAND, SILTY RELATIVE DENSITY				
NO. OF BLOWS REQ'D TO DRIVE A SAMPLE 1 FT. USING	140# FALLING 30"	370# FALLING 1.8'		
	A	C	B	
SAMPLE DESCRIPTION	1 1/2" I.D. OR 2" O.D. (STD. PEN.)	1 1/2" I.D. OR 2" O.D.	2" I.D. OR 2 1/2" O.D.	
	VERY LOOSE LOOSE MEDIUM VERY DENSE	<4 4-10 10-30 30-50 >50	<2 2-5 5-15 15-25 >25	<3 3-7 7-21 21-34 >34
CONSISTENCY OF CLAY				
NO. OF BLOWS REQ'D TO DRIVE A SAMPLE 1 FT USING	140# FALLING 30"	370# FALLING 1.8'		
	A	C	B	
SAMPLE DESCRIPTION	1 1/2" I.D. OR 2" O.D. (STD. PEN.)	1 1/2" I.D. OR 2" O.D.	2" I.D. OR 2 1/2" O.D.	
	VERY SOFT SOFT MEDIUM STIFF VERY STIFF HARD	<2 2-4 4-8 8-15 15-30 >30	<1 1-2 2-4 4-8 8-15 >15	<2 2-3 3-5 5-10 10-20 >20

0.0

L.W.D. ELEV. 576.82

1.2'

WATER

1

VERY LOOSE
BLACK FIBEROUS
ORGANIC SILT
W/VEGETATION

0-0.5' } BLOWS OF 140#
0-0.5' } HAMMER FALLING
0-0.5' } 30 DRIVING A
2" O.D. SAMPLE

6.4'

VERY SOFT
GRAY/PINKISH
BROWN SILTY
CLAY

5

2

2-0.5'
2-0.5'
2-0.5'

9.4'

GRAVELS W/ COBBLES
AND SAND

9.9'

GRAY GRAVELLY
SAND

10.4'

VERY HARD
DARK GRAY
DOLOMITE ROCK
W/ MASSIVE
BEDDING

3

COHED
41% REC.

4

COHED
100% REC.

COHED

16.9'

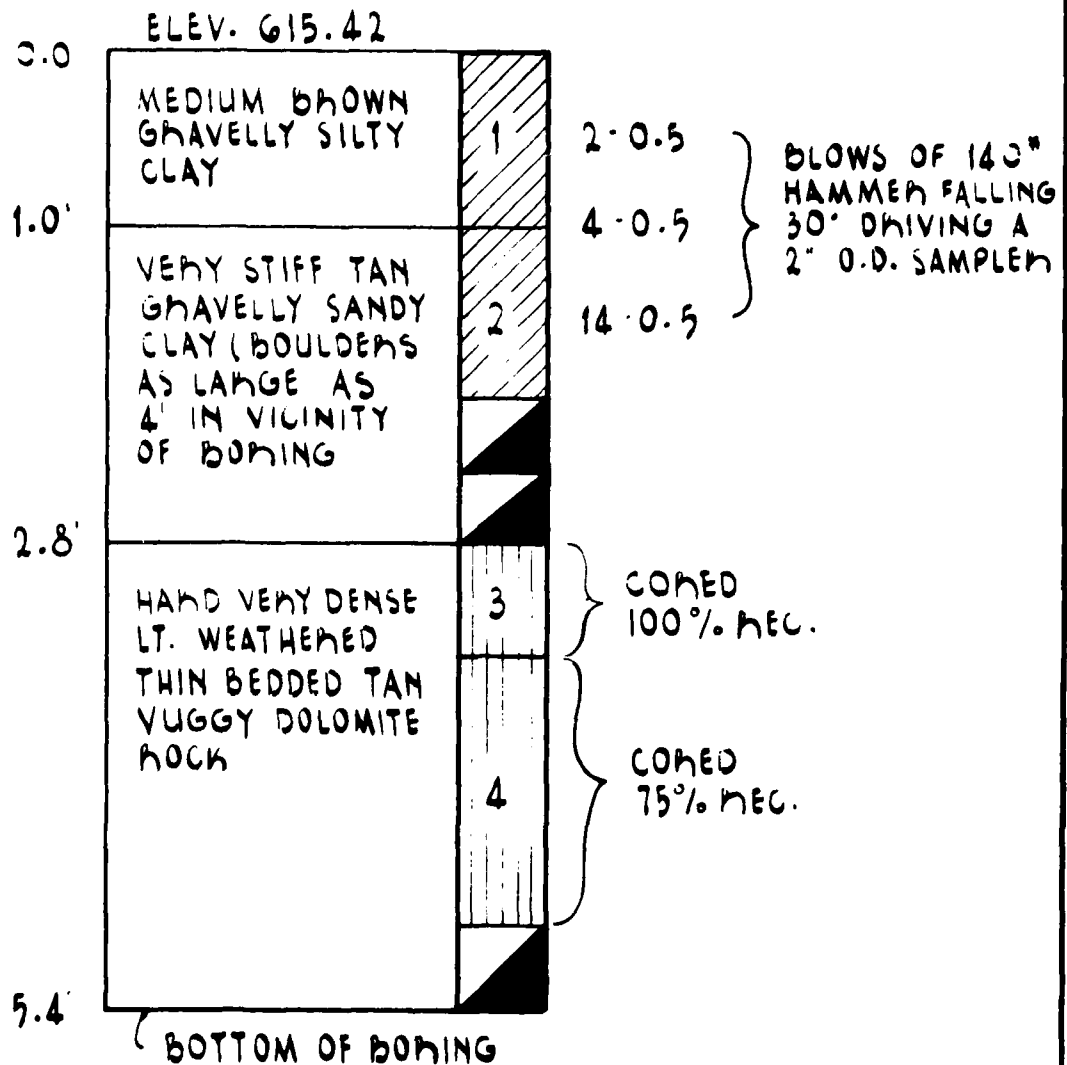
BOTTOM OF BORING

BORING NO. LC1-77

27 JULY 1977

CEDARVILLE HARBOR

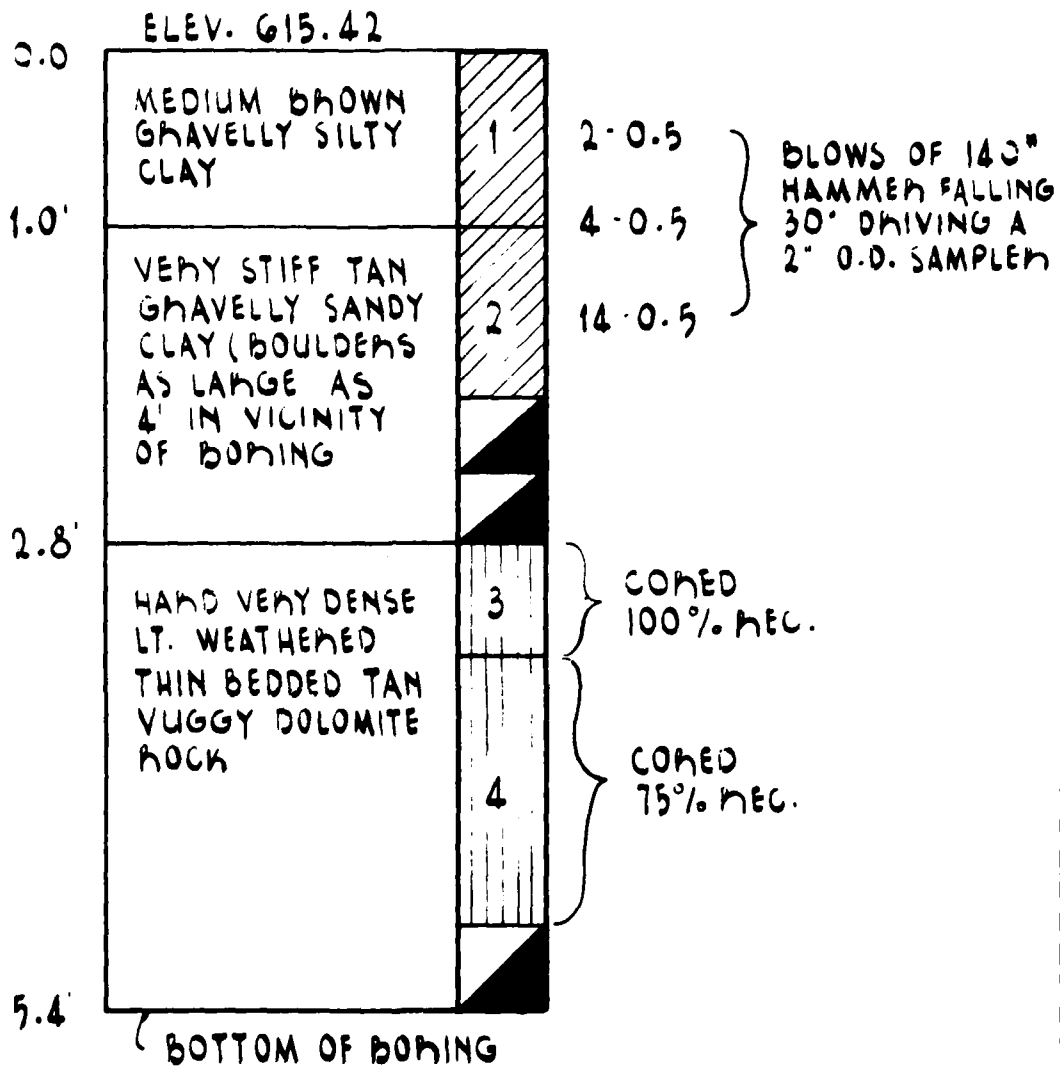
LES CHENEUX DISPOSAL AREA
CEDARVILLE, MICHIGAN
GIFFELS ASSOCIATES, INC.
SOUTHFIELD, MICHIGAN



BOHING NO. LC 2-77
24-27 JULY - 1977

CLARK TOWNSHIP
LAND FILL AREA

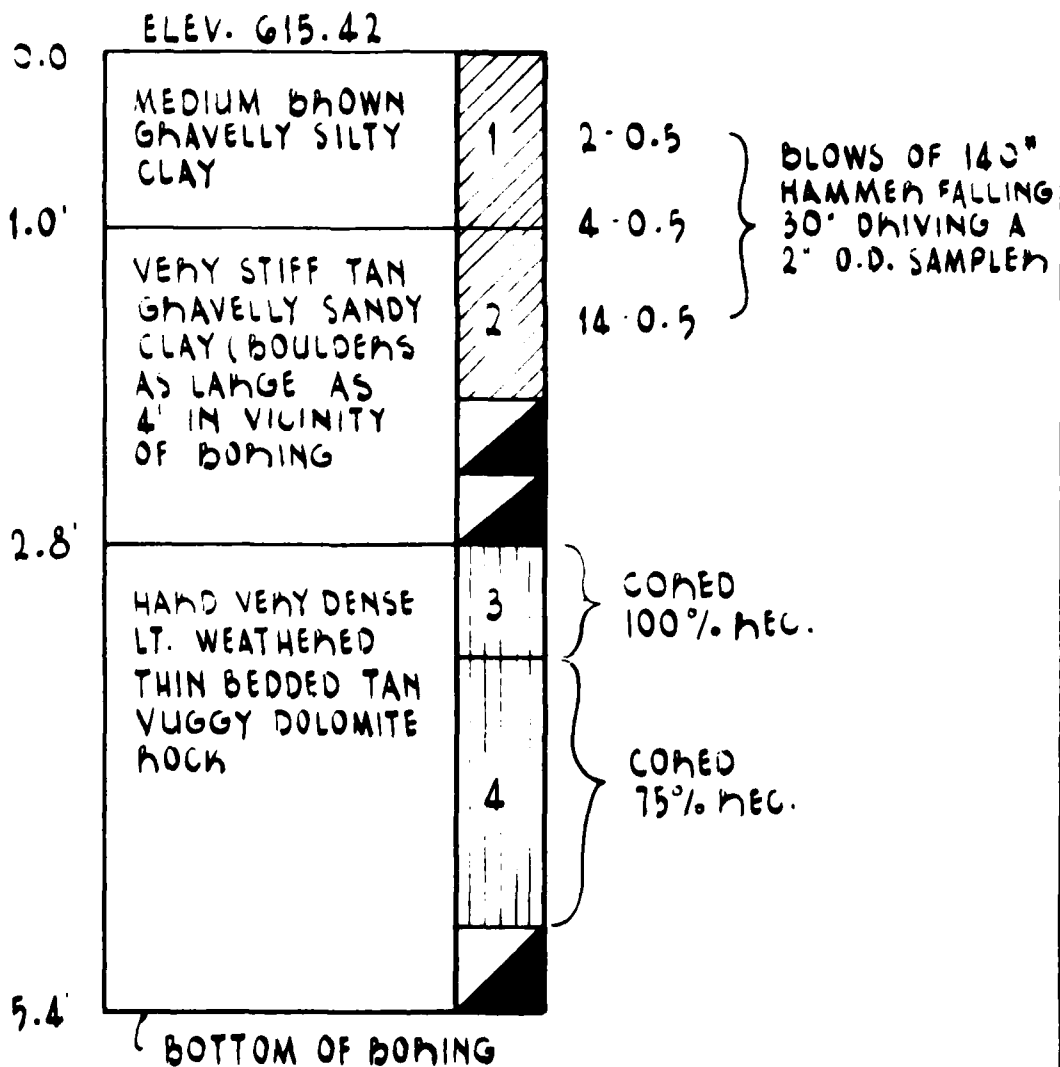
LES CHENEAUX DISPOSAL AREA
CEDARVILLE, MICHIGAN
GIFFELS ASSOCIATES, INC.
SOUTHFIELD, MICHIGAN



BORING NO. LC 2-77
24-27 JULY - 1977

CLARK TOWNSHIP
LAND FILL AREA

LES CHENEAUX DISPOSAL AREA
CEDARVILLE, MICHIGAN
GIFFELS ASSOCIATES, INC.
SOUTHFIELD, MICHIGAN



BORING NO. LC 2-77
24-27 JULY - 1977

CLARK TOWNSHIP
LAND FILL AREA

LES CHENEAUX DISPOSAL AREA
CEDARVILLE, MICHIGAN
GIFFELS ASSOCIATES, INC.
SOUTHFIELD, MICHIGAN

APPENDIX 4

PERTINENT CORRESPONDENCE



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST
CHICAGO, ILLINOIS 60604



DEC 10 1976

Colonel Melvin D. Remus
District Engineer
Detroit District, Corps of Engineers
Box 1027
Detroit, Michigan 48231

Dear Colonel Remus:

Reference is made to an August 2, 1976, request by the Michigan Department of Natural Resources for a determination of the eligibility for waiver of the 25 percent non-federal contribution for the contained dredge spoil disposal program at the Les Cheneaux Islands, Michigan.

Section 123(d) of Public Law 91-611 gives the authority to the Secretary of the Army to waive the required local cooperation when the U.S. Environmental Protection Agency finds that certain requirements are being met. The two requirements that must be fulfilled are:

1. Local entities must be participating in and in compliance with an approved plan for the general geographical area of the dredging activity for construction, modification, expansion, or rehabilitation of waste treatment facilities.
2. Applicable water quality standards are not being violated.

Since both requirements have been satisfied, we find that the local sponsor is eligible for the waiver of the 25 percent non-federal contribution towards construction costs of the dredge spoil disposal program for the Les Cheneaux Islands' channels.

If we can be of further assistance, please do not hesitate to contact this office.

Sincerely yours,


Valdas V. Adamkus
Deputy Regional Administrator

C O P Y

DEPARTMENT OF THE ARMY
ENGINEER DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1087
DETROIT, MICHIGAN 48231

27 DEC 1976

NOLED-T

Dr. Howard A. Tanner
Director, Dept. of Natural Resources
Stevens T. Mason Building
Lansing, MI 48226

Dear Dr. Tanner:

This concerns your 2 August 1976 request to the United States Environmental Protection Agency for a waiver of the 25 percent non-Federal contribution for the contained dredge spoil disposal program at Les Cheneaux, Michigan.

Paragraph (c) of Section 123 of the River and Harbor Act of 1970 (Public Law 91-611) requires the appropriate state or states, interstate agency, municipality, or other appropriate political subdivision of the state to agree to contribute to the United States 25 percent of the construction costs prior to construction of a contained disposal facility. The Environmental Protection Agency has found that Les Cheneaux is participating in and in compliance with an approved plan for the geographical area of the dredging activity for construction, modification, expansion or rehabilitation of waste treatment facilities and applicable water quality standards are not being violated. Consequently, the Environmental Protection Agency has found Les Cheneaux eligible for a waiver from contribution to construction costs.

This is to inform you that I have reviewed the findings of the Environmental Protection Agency in this matter. By the provisions of paragraph (d), Public Law 91-611, under the authority of the Secretary

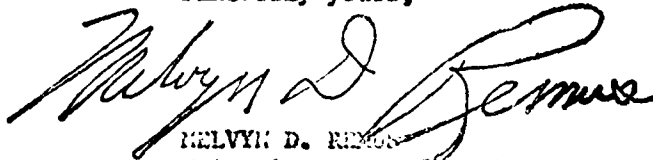
MCLED-T

Dr. Howard A. Tanner

27 DEC 1976

of the Army, I do hereby grant a waiver of the obligation of non-Federal interests to contribute 25 percent of the construction costs of the proposed spoil disposal facility to be located at Les Cheneaux, Michigan.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Melvin D. Edson".

MELVIN D. EDSON
Colonel, Corps of Engineers
District Engineer

Copy Furnished:

Mr. Dale Granger, Chief, Hydrological Division

NATURAL RESOURCES COMMISSION

CARL T. JOHNSON
E. M. LAITALA
DEAN PRIDGEON
MILARY F. SNELL
HARRY H. WHITELEY
JOAN L. WOLFE
CHARLES G. YOUNGLOVE



WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING, BOX 30028, LANSING, MICHIGAN 48909
HOWARD A. TANNER, Director

May 13, 1977

Mr. Philip A. McCallister, Chief
Engineering Division
U. S. Corps of Engineers
P. O. Box 1027
Detroit, Michigan 48231
Attn: Richard Kavalor

Dear Mr. McCallister:

Reference is made to your February 1 letter concerning dredged material disposal sites at Frankfort, Les Cheneaux, Inland Route, Harbor Beach, St. Joseph, Port Austin, and Sebewaing. The Department Dredge Spoil Committee wishes to reaffirm its earlier positions concerning these site needs as reviewed in several meetings with your staff earlier.

- 1) Frankfort: The Department favors filling of the BOR site and trucking excess material to State Forest properties. The Committee's second consideration for Frankfort would utilize designated Luedke properties as an interim holding area with trucking of all dewatered materials to State Forest properties.
- 2) Les Cheneaux: The Department Committee recommends permanent containment at the township dump with utilization of an interim handling site at the golf course site or lacking that capability then development of an off-loading site at the Department boat launching facility which will be constructed as part of a project at Cedarville.
- 3) Inland Route: The Department favors an off-loading facility at the end of Snyder Road with final containment on the east side of Snyder Road just south of Brutus Road on State Forest properties.
- 4) Harbor Beach: The Committee strongly favors the utilization of city owned property at the northern city limits as an interim handling site with trucking of material to the county owned gravel pit.
- 5) St. Joseph: Committee favors utilization of the Whirlpool Corporation properties as an interim handling site with final disposal at Site 7 by truck delivery on a parcel of property which has been used as an industrial dump. We understand it has not been acquired by the local government.



RI028 10/76

Mr. Philip A. McCallister
Attn: Richard Kavalor
May 13, 1977
Page Two

- 6) Port Austin: The Committee favors construction of a near shore island facility east of the present recreational watercraft harbor facilities with a causeway connection to permit public use of this island for recreational purposes on completion.
- 7) Sebewaing: The Department Committee favors utilization of the land at the northern terminus of the present village airport with construction of a 30-acre littoral marsh replacement project as mitigation for the losses attendant with the airport site.

If you have further questions on these views, please feel free to contact us.

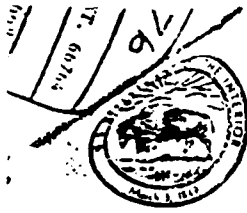
Very truly yours,

BUREAU OF LAND & WATER MANAGEMENT



Dale W. Granger, P.E., Chief
Water Management Division

DWG:cjs



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY REFER TO:
LWR

Colonel Melvyn D. Remus
U.S. Army Engineer District
Detroit
P.O. Box 1027
Detroit, Michigan 48231

OCT 1 1976

Dear Colonel Remus:

This letter concerns proposed dredge disposal sites at Frankfort, Inland Route and Les Cheneaux Channels, Michigan. On September 27-29, 1976, we inspected the projects as a part of a site selection committee composed of representatives from U.S. Environmental Protection Agency, Corps of Engineers, respective city and township officials and personnel from the Michigan Department of Natural Resources. Our findings are as follows:

Six sites were examined by the committee at Frankfort. Four of these sites involved encroachment of wetland areas and as such, we would oppose their use as sites for either temporary or final disposal of dredge materials. We would not oppose the temporary storage site on Lucke Steel Company property near Lake Betsie and trucking the materials to an upland site in the Betsie River State Forest.

Three temporary sites and one final disposal site were examined near Burt Lake, Michigan for materials to be removed from the Inland Route. We would not object to the use of the final disposal site located at the nearby township dump. The three temporary holding sites, however, involve encroachment on mixed deciduous-evergreen wooded swamps and we would oppose their use for disposal purposes. Other non-wetland type habitat should be examined for a temporary storage site.

The township dump was selected as the final repository for dredge material at Cedarville. It is an excellent site. All temporary storage sites that were examined at Cedarville involved wetland areas. We would oppose using any wetlands as disposal areas, whether for temporary or permanent use. The two upland areas examined for possible disposal on Government Island would not be in the best interest of present management concepts for the island and we would oppose dumping any material on that island. Other non-wetland type of habitat should be examined for a temporary storage site. The possibility of using the parking lot near the Les Cheneaux Golf Club or other upland sites should be investigated.

Sincerely yours,

cc: Michigan Dept. of Natural Resources

John J. Gorman, Director
Michigan Department of Natural Resources



MICHIGAN DEPARTMENT OF STATE
RICHARD H. AUSTIN SECRETARY OF STATE



LANSING
MICHIGAN 48918

July 27, 1977

MICHIGAN HISTORY DIVISION
ADMINISTRATION, ARCHIVES,
HISTORIC SITES, AND PUBLICATIONS
3423 N. Logan Street
517-373-0610
STATE MUSEUM
505 N. Washington Avenue
517-373-0616

Dr. J. C. Sutherland, P.E.
Williams & Works
611 Cascade West Parkway, S.E.
Grand Rapids, Michigan 49506

Dear Sir:

Our staff has reviewed the following projects and concludes that they will have no effect on cultural resources.

Disposal Site, Port Austin Harbor, Huron County

Disposal Site, Les Cheneaux Harbor, Mackinac County

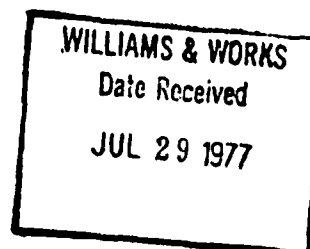
If you have further questions, please contact Dr. Lawrence Finfer, Environmental Review Coordinator for the Michigan History Division. Thank you for giving us the opportunity to comment.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Martha M. Bigelow", written over a horizontal line.

Martha M. Bigelow
Director, Michigan History Division
and
State Historic Preservation Officer

MMB/LF/cw



**LUCE - MACKINAC - ALGER - SCHOOLCRAFT
DISTRICT HEALTH DEPARTMENT**

COMMUNITY BUILDING

NEWBERRY, MICHIGAN 49868

TELEPHONE 293-6107

July 13, 1977

Jeffrey C. Sutherland
Williams & Works
611 Cascade West Parkway, S. E.
Grand Rapids, Michigan 49506

Reply to:
Mackinac County
Medical Care Facility
St. Ignace, MI 49781
Telephone: 643-7700

RE: Sediment Disposal, Cedarville, Michigan

Dear Mr. Sutherland:

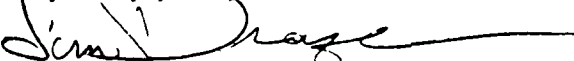
I am responding to your June 24, 1977, letter requesting information on water quality problems in the Cedarville area of Clark Township, Mackinac County, Michigan.

We have been monitoring water quality from wells in the Cedarville area. Our survey has found that older wells, terminated in the fractured Engadine Dolomite, which outcrops north of Cedarville and is shallow beneath the village itself, are subject to surface water contamination. High chloride concentrations, and the presence of detergents in a few water samples, indicates that these older wells are receiving surface runoff. Very few, if any, of the old wells were properly grouted. It is possible that much of the surface water follows the well casings into the fractured, dolomite.

In lieu of further discussion by me, I am sending you copies of correspondence we have received from the Michigan Department of Natural Resources, Geological Survey Division, pertaining to this matter. You will find, attached, a memorandum from Donald R. Brackenbury, Geologist, a hand-drawn sketch locating 28 wells and a series of water sample results, under comments, the term polluted indicates a coliform index greater than 0.0 per 100 ml.

Finally, in my opinion, the dumping of dredgings from Les Cheneaux Harbor on the sites mentioned in your June 24, 1977, letter will not create a water quality problem. The disposal sites are far enough from the areas most subject to surface runoff that we do not foresee a problem resulting from your proposed activity.

Very truly yours,


James Drazé, Sanitarian

JD/rb

cc: R. Holben, MDPH

STATE OF MICHIGAN



WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

HOWARD A. TANNER, Director

201 State Office Building
Escanaba, Michigan 49829

March 17, 1977

NATURAL RESOURCES COMMISSION

CARL T. JOHNSON
E. M. LAITALA
DEAN PRIDGON
HILARY F. SNELL
HARRY M. WHITELEY
JOAN L. WOLFE
CHARLES E. YOUNGLOVE

TO: James Draz, Sanitarian, Mackinac County Health Department

FROM: Donald R. Brackenbury, Geologist, Escanaba Office, Geology Division

SUBJECT: Polluted water wells in Cedarville area--Mackinac County

Water wells in the vicinity of the intersection of M-134 and M-129 at Cedarville have had problems for a long time, but few people realized what they were or how to avoid them.

From Walt Litzner's notes on some of the well logs in this area, it appears that the first water you hit in the top of the bedrock will probably have high iron or a bad smell or taste. To get over this, Walt advises drilling an oversized hole past this bad aquifer and setting and cementing casing through the bad water (probably from 50 to 90'--DRB). The well is then completed in the next aquifer that is encountered (from 90 to 190' deep).

Here are some of the reasons that contribute to the "bad water" situation in this area:

1. The area around the intersection and to the west and south is a bedrock high. Bedrock is encountered around 8' at Seymour Nordquist's, 8' at Ray Hamel's, 13' at David Williams', 16' at James Williams', 16' at Waldron Hanson's, and 16' at the Town Hall. With bedrock so near the surface, there isn't much glacial drift (sand, gravel, or clay, etc.) to filter the surface water, as it soaks on down to the first ground water zone.
2. The upper part of all this bedrock in the area is fractured and weathered with large water-bearing openings. It is called the "Engadine Dolomite" and outcrops in many places within a few miles of Cedarville.
3. The highway intersection is heavily salted at times during the winter to melt ice and snow, and this salt solution soaks away into the ground alongside the road.
4. The sewage treatment plant is fairly new. Up until 1974 or 1975, everyone in the area had septic tanks which added to the pollution of the upper ground water. The old septic tanks may all be OK now due to time and bacterial action.



R1026-1 3/76

4-10

MICHIGAN The Great Lake State



March 17, 1977

5. Most of the polluted or high iron or chloride wells are shallow and completed in the upper part of the bedrock, although a few had H_2S water as deep as 80'.
6. As far as we know, none of these polluted wells have had their casing cemented in place.
7. Improperly constructed wells could and probably do cause harm to nearby wells by allowing polluted waters to run down alongside the casing and out into good aquifers and then migrating over to properly constructed wells.

In my opinion, to cure the problems in the area, the local Health Department should insist on having several things done.

Any new wells in the area (at least within $\frac{1}{2}$ mile south and west and $\frac{1}{2}$ mile north and east of the intersection of M-134 and M-129) should have casing grouted in place through the upper bedrock water even if they have to go to 60 or 80'. (A minimum of 25 or 30' of the upper bedrock should be sealed off.) Good water should be found in the next aquifer, probably no deeper than 200' in the most extreme case.

Old wells could be helped by running and cementing a liner to the old total depth, grouting it in place, and then drilling on to deeper water. In some wells there is a possibility of fishing out the old casing and reaming the hole to the old T.D. before setting and cementing the new casing. If the old polluted well is not repaired, it should be properly plugged to prevent any contamination from spreading to nearby wells.

Any well that has a history of high iron, chloride, ABS (detergent), or H_2S , is to be suspected of being a bad well (i.e. one that has been completed in a polluted aquifer or one that has been improperly completed).

The only well in your water well survey that I would consider to be a good well is the Cedar Tool Company well. All others show excessive iron, chloride, and ABS. The test for H_2S is only valid for a very fresh sample. It usually disappears by the time the sample goes through the mail. The test for iron is also an elusive one. Unless you are using a specially treated bottle, most of the iron precipitates out within one or two days.

To get a proper sampling of the area, one should have a well record of each well sampled, including information on depth to bedrock, depth of casing, grout information, total depth of well, and precise location of well. Wells should be tested for iron, chlorides, ABS, $CaCO_3$, and H_2S . Note: Tests for iron and H_2S should be made at the well site, if possible, since the iron precipitates out and the H_2S bubbles off and escapes while the samples are in the mail.

James Draz

-3-

March 17, 1977

I'm enclosing a map of the intersection area with a few wells plotted. I am not too sure of the location of some of the wells, but most of them should be in the right place. The well locations are numbered and listed on a separate sheet with some well data. You might want to expand this idea somewhat and possibly make some overlays showing the zone of contamination as well as the bad wells that have already been plugged, repaired, or redrilled.

The "Bedrock High" runs southeast-northwest and lies under the highway intersection. If I had more well records in the right area, I could make a good contour map of this "High." The highest part of this "High" is probably around 5' from surface south of the intersection and drops off quite rapidly as you go northeast or southwest from that point. The backbone of the "High" runs from near the Drive-In restaurant (SW SE SE, 25) to near the church on Hodek Street (SE NW NW, 31).

If you want any more ideas on the subject, just ask. I would like more well records of the area to draw up a good contour map of the bedrock.

Best Regards!

DRB:gs

cc: J. VanAlstine
M.D.P.H.

Alan Brackley





UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST
CHICAGO ILLINOIS 60604

February 1, 1977

Mr. Bernard Malamud
Acting Chief
Engineering Division
Detroit District, Corps of Engineers
Box 1027
Detroit, Michigan 48231

Dear Mr. Malamud:

Reference is made to your letter of February 1, 1977, concerning E.P.A.'s position on alternate dredge material disposal sites at Frankfort, Les Cheneaux, Inland Route, Harbor Beach, St. Joseph, Port Austin, and Sebawaing, Michigan as discussed by the Site Selection Committee at their January 20, 1977 meeting. We trust the following information will clarify our position on each project proposed for the above harbors.

Frankfort

The Committee discussed two feasible alternatives for dredge material disposal at Frankfort: to fill the Bureau of Outdoor Recreation (BOR) Site No. 4 and truck excess material to the State forest property or use the Luedtke property, Site No. 5 as an interim holding area and truck all the material to the State forest property. Another alternative discussed involved using the Luedtke and State forest property for the backlog material until the BOR site is available. We do not anticipate any significant adverse impacts with any of the above sites and concur with developing sites 4 and 5 as interim sites and the State forest as the ultimate site.

Les Cheneaux

We have attended a meeting subsequent to the Site Selection Committee Meeting on spoil disposal at Les Cheneaux at State Senator Davis's office in Lansing. Due to objections expressed by the Michigan Department of Natural Resources, U.S. Fish and Wildlife Service and our Agency with regard to the wetland area involved, we understand that Site No. 4 (adjacent to the Taylor Lumber Company) is no longer under consideration. Based on our preliminary review, we would concur with development of either Sites 2a and/or 2b with final deposition at the Township dump. The final assessment of Sites No. 2a and 2b should include impacts associated with trucking the spoil i.e., adequacy of local roads to accommodate trucks, spoil slippage from trucks, noise impacts etc.

Inland Route

We concur with the use of the Site Nos. 1 and 2 as interim storage areas and Nos. 5 and 6 for final deposition of dredged material.

Harbor Beach

We concur with the use of the City-owned property at Site No. 1 as an interim drying area and final deposition at the county-owned gravel pit (Site No. 3) at Harbor Beach.

St. Joseph

We concur that Site 7 (Mallable) and Site 8 (ships canal) are acceptable for spoil disposal at St. Joseph Harbor. We conducted a field investigation of Site 10 on March 9, 1977, and found it to be acceptable as well.

Port Austin

Our November 1, 1976, letter to your office indicated that we preferred the village lagoon site (Site E) for confined disposal at Port Austin. We understand from the Site Selection Committee meeting that this upland site is no longer available for spoil disposal. Since there are no apparent environmental problems with the island site (Site C), we will concur with a decision to proceed with its design. More specific information on the facility's affects on littoral processes, harbor water quality, etc. should be included in subsequent assessments.

Sebewaing

We understand that the development of Site A-1 at Sebewaing and its ultimate use as an airport runway extension has the support of the local community. We also note your proposal to replace the 7 to 8 acres of wetlands that would be lost with construction of Site A-1 with an equivalent area in deeper water and adjacent to the navigation channel. However, considering the value of existing wetlands at Site A-1, our Agency finds construction of a confined facility there unacceptable until all feasible alternatives to wetland destruction have been thoroughly evaluated.

We commend your efforts to derive public benefit in developing a dike disposal area for polluted materials and your offer to mitigate wetland loss. We believe your proposal to replace wetlands presents an excellent method of compensation for projects which have already adversely impacted wetlands, as well as for future projects for which there is no other alternatives that would avoid wetland impacts. We would be pleased to see such a research effort undertaken. But we do not believe such mitigation is appropriate in a situation where the initial destruction of wetlands can be avoided.

It was agreed upon conclusion of the Site Selection Committee Meeting that the Corps would prepare an expanded Environmental Assessment for the Sebewaing project which would be distributed to all Committee members for their review and comment. We believe the following information should be included in the expanded assessment to evaluate both the potential and the impacts of the proposed airport runway extension and flood protection associated with development of Site A-1.

1. The feasibility as well as a need of runway extension should be thoroughly addressed. It should be determined if airport officials have initiated any steps to extend the airport runway; these steps should be explained. Would runway extension be solely a local project or would there be State or Federal monetary or licensing involvement. The probability of such Federal or State approval should be investigated. It should be determined if the project would result in any change in the number of operations or type of aircraft at the airport.

2. The details of flood protection potential with development of Site A-1 should be thoroughly addressed. The degree of past flooding and costs of damages incurred should be determined. Alternative flood protection methods (both structural and non-structural) for areas impacted should be compared with regard to effectiveness, environmental effects, costs, and benefits.

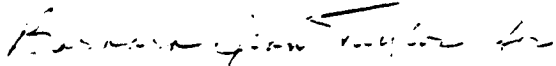
3. The feasibility of marsh construction should be discussed with specific regard to the type of fresh water habitat typical to the study area. The quality of the existing marsh should be determined and compared to that which would be constructed. Some attempt should be made to quantify comparable wetlands in the study area. If possible, a comparison should be made regarding the acreage of comparable wetland which has already been lost to development in the study area. Finally, the timing of wetland construction should be discussed, i.e., would development of Site A-1 be implemented after (or before) marsh construction?

4. The feasibility of alternatives to construction in the wetlands should be thoroughly evaluated. The potential use of dredge spoil as a beneficial resource e.g., as construction material, land fill, and/or agricultural cover should be addressed. Impacts with regard to transporting dredge material should be included.

- 4 -

Please note that our comments on each of the above projects are preliminary at this time and that our final position will be determined after our review of the Draft Environmental Impact Statement on each project. If you have any questions regarding our comments, please contact Ms. Barbara J. Taylor of my staff at 312-353-2307.

Sincerely yours,



Gary A. Williams
Chief,
Environmental Review Section



United States Department of the Interior

FISH AND WILDLIFE SERVICE
EAST LANSING FIELD OFFICE (ES)

Room 301, Manly Miles Building
1405 S. Harrison Road
East Lansing, Michigan 48823

IN REPLY REFER TO:

September 22, 1978

Colonel Melvyn D. Remus
U.S. Army Engineer District, Detroit
P.O. Box 1027
Detroit, Michigan 48231

Dear Colonel Remus:

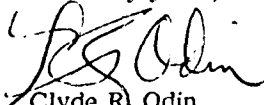
This letter responds to the public notice dated September 6, 1978 concerning the dike disposal area, Les Cheneaux Island Channels, Michigan. Several inconsistencies exist between the public notice and the draft environmental statement published in September, 1977. We request a clarification of the following points.

Paragraph e, Page 3: In the original draft environmental statement only three and one half acres of trees south of the existing cleared area would be cleared, in contrast to the five and one half acres to be cleared as stated in this public notice. Clarification or justification for removing the two additional acres of wildlife habitat would be helpful information.

The public notice does not contain reference to the total area of the diked disposal area, unless the nine acres referenced in paragraph i, Page 3, under Sealing System, is the same as the disposal area. If so, the disposal area would be two acres larger than that indicated in the draft environmental statement which stated a requirement of only seven acres for the deposition of the same amount of material.

Paragraph g, Page 3: Please provide us with the location(s) of where fill materials will be obtained to construct the containment facility.

Sincerely yours,


Clyde R. Odin
Supervisor

MCRED-T

30 OCT 1978

Mr. Clyde P. Odin
Fish and Wildlife Service
East Lansing Field Office (ES)
Rm., 301, Manly Miles Bldg.
1405 S. Harrison Rd.
E. Lansing, Michigan 48823

Dear Mr. Odin:


Thank you for your letter dated 22 September 1978 concerning the Public Notice for the dike disposal area at Les Cheneaux Island Channels, Michigan.

The inconsistencies between the Public Notice and the Draft Environmental Statement are due to the refining of the proposed method of operation. It was originally necessary to clear only three and one half acres because the dredge material was to be placed within an unsealed dike. However, due to concern over ground water contamination, the dike must be sealed with a 2 ft. thick layer of clay. Two additional acres of disposal area is therefore required to compensate for the volume lost to the seal. The disposal facility should occupy nine acres; five and one half acres need to be cleared.

There are numerous sources of granular fill and clay in eastern Chippewa County. Approved sources are usually designated in the Plans and Specifications. These documents are distributed, upon request, to Federal Agencies that have become involved in the project.

Please contact Edward Horn (8-226-6784) of my staff or myself if you have any further questions.

Sincerely yours,


P. McCauley
Chief, Engineering Division

APPENDIX 5

COMMENTS TO THE

DRAFT ENVIRONMENTAL IMPACT STATEMENT

FEDERAL ENERGY REGULATORY COMMISSION
Federal Building - 31st Floor
230 South Dearborn Street
Chicago, Illinois 60604

November 4, 1977

U.S. Army Engineer District, Detroit
P.O. Box 1027
Detroit, Michigan 48231

Attn: Chief, Environmental Resources Branch
Your Reference NCEED-ER

Gentlemen:

We have reviewed the Draft Environmental Impact Statement dated September 1977 for the Confined Disposal Facility and Maintenance Dredging of the Federal Navigation Channels, Les Cheneaux Islands, Michigan.

Comments of this office are made in accordance with the National Environmental Policy Act of 1969 and the August 1, 1973 Guidelines of the Council on Environmental Quality. Our principal concern with this development is its effect on bulk electric power facilities including potential hydroelectric developments and on natural gas pipeline facilities.

Since the above noted proposed project apparently would pose no major obstacle to the construction of such facilities, we have no comments on the Draft EIS.

The statements are of this office and do not necessarily represent the views of the Federal Energy Regulatory Commission.

Very truly yours,

Bernard D. Murphy
Regional Engineer

By: Herbert R. [Signature]
(Acting)

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
NORTHEASTERN AREA, STATE AND PRIVATE FORESTRY
6816 MARKET STREET, UPPER DARBY, PA. 19082
(215) 596-1671

8410
November 28, 1977



Mr. P. McCallister
Chief, Engineering Division
U.S. Army Engineer District, Detroit
ATTN; Chief, Environmental Resources Branch
P.O. Box 1027
Detroit, Michigan 48231

Refer to: NCEED-ER, Draft
Environmental Statement, Maintenance
Dredging of the Federal Navigation
Channels, Les Cheneaux Islands, MI

Dear Mr. McCallister:

We believe that the final statement should address the reestablishment of plant cover on the confined disposal facility, as we have indicated in our comments on the Frankford and St. Joseph's Harbor draft environmental statement.

Thank you for the opportunity to review this draft statement.

Sincerely,

DALE O. VANDENBURG
Staff Director
Environmental Quality Evaluation

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE Room 101, 1405 South Harrison Road
East Lansing, Michigan 48823

November 21, 1977

U.S. Army Engineer District, Detroit
ATTN: Chief, Environmental Resources Branch
P.O. Box 1027
Detroit, MI 48231

Gentlemen:

We have reviewed the draft environmental statement and letter report on Confined Disposal Facility and Maintenance Dredging of the Federal Navigation Channels, Les Cheneaux Islands, Michigan, and have the following comments to make:

1. The draft environmental statement does not state clearly how rainfall runoff from the disposal site will be handled.
2. The draft environmental statement indicates that a permanent seeding will be accomplished at the end of the ten-year project period. We would like to suggest that consideration be given to making temporary seeding during the project period. We believe that a temporary seeding could be very effective in controlling potential wind erosion and would be more practical than attempting to wet down the area after wind erosion starts, as is suggested in the statement.

We appreciate the opportunity to review and comment on this proposed project.

Sincerely yours,


Arthur H. Cratty
State Conservationist

cc: Coordinator, Environmental Quality Activities, USDA, Washington, D.C.
R. M. Davis, Administrator, SCS, Washington, D.C.





UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230
(202) 377-3111

December 14, 1977

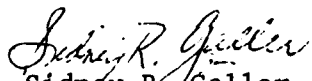
Mr. P. McCallister
Chief, Engineering Division
Department of the Army
Detroit District, Corps of Engineers
Box 1027
Detroit, Michigan 48231

Dear Mr. McCallister:

This is in reference to your draft environmental impact statement entitled, "Confined Disposal Facility and Maintenance Dredging of the Federal Navigation Channels Les Cheneaux Islands, Michigan." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight (8) copies of the final statement.

Sincerely,


Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosures - Memo from National Ocean Survey, November 15, 1977
Memo from Great Lakes Environmental Research
Laboratory, November 14, 1977



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

C52/JLR

NOV 16 1977

NOV 15 1977

TO: William Aron
Director
Office of Ecology and Environmental Conservation

FROM: *Gordon Lill*
Gordon Lill
Deputy Director
National Ocean Survey

SUBJECT: DEIS #7710.26 - Confined Disposal Facility and Maintenance
Dredging of the Federal Navigation Channels
Les Cheneaux Islands, Michigan

The subject statement has been reviewed within the areas of NOS responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

The following comments are offered for your consideration.

On page 11, please change 575.38 feet to 575.35 feet (lowest levels), and 581.0 feet to 581.04 feet (high levels).

Geodetic control survey monuments may be located in the proposed project area. If there is any planned activity which will disturb or destroy these monuments, NOS requires not less than 90 days' notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project includes the cost of any relocation required for NOS monuments.





U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES
Great Lakes Environmental Research Laboratory
2300 Washtenaw Avenue
Ann Arbor, Michigan 48104

November 14, 1977

NOV 16 1977

TO: Director
Office of Ecology and Environmental Conservation, EE

FROM: E. J. Aubert
Director, GLERL, RF24

SUBJECT: DEIS 7710.26 Confined Disposal Facility and Maintenance Dredging
of the Federal Navigation Channels Les Cheneaux Islands, Michigan

The subject DEIS prepared by the Corps of Engineers, Detroit District, on maintenance dredging in Les Cheneaux Islands navigation channels and on construction of confined disposal facility has been reviewed and comments herewith submitted.

Analysis of sediment from the bottom of Les Cheneaux Islands navigation channels produced confusing results. The 1973 sampling by the Environmental Protection Agency (EPA) indicated that all bottom deposits are polluted and therefore not suitable for open lake disposal. In discussing the 1976 sampling, EPA found that all sediment are suitable for unrestricted or restricted open lake disposal. It appears that the main difference is in criteria used for determination of pollution level. Standards for 1973 sampling were based on criteria established for all waters of the nation and are grouped into two groups, non-polluted and polluted. The 1976 standards were based on compilation of data from over 100 different harbors in the Great Lakes and are grouped in three groups--non-polluted, moderately polluted, and heavily polluted. Non-polluted sediment are suitable for unrestricted open lake disposal. Moderately polluted sediment are suitable for open lake disposal with certain restriction. And only the heavily polluted sediment must be placed in confined disposal facilities. The 1976 sampling indicated that 25% of the channels have unpolluted sediment, 60% have unpolluted/moderately polluted, and 15% have moderately polluted. None of the sediment were found to be heavily polluted.

Considering the basic question of how to dispose of the dredged material, the Impact Statement provides incorrect or confusing information. For example, paragraph 1.02 states that in 1973 and 1976, sediment to be dredged from the Les Cheneaux Island Channels were identified as unsuitable for open lake disposal by the EPA. Paragraph 1.16 states that portions of the channel bottom sediment are considered suitable for open water disposal.



In view of the very high costs of spoil disposal on land, including the adverse environmental impacts associated with such disposal, a detailed examination of pollution sources appears to be highly justified. The Statement indicates that the shoals are believed to originate from the shallower natural lake bottom on each side of the previously dredged channels (par. 1.05). In this situation, disposal of the spoil in the open lake is fully justified, since there would be a futile effort to improve nature lake environment. In discussing harbor sediment quality (par. 2.20) this Statement finds that the primary source for these contaminated sediment may have come from untreated waste originating from the Village of Cedarville and its environs. It appears that placement on land of the spoil from the vicinity of Cedarville probably could be justified, although the 1976 EPA survey allows restricted open lake disposal. If disposed in the lake, a site in deep water, say over 100 foot in depth, should be used.



United States Department of the Interior

OFFICE OF THE SECRETARY
NORTH CENTRAL REGION
2510 DEMPSTER STREET
DES PLAINES, ILLINOIS 60016

ER-77/961

December 5, 1977

Colonel Melvyn D. Remus
District Engineer
U.S. Army Engineer District
Detroit
P.O. Box 1027
Detroit, MI 48231

Dear Colonel Remus:

In response to your letter of October 20, 1977, we have reviewed the draft environmental statement and letter report for Maintenance Dredging of the Federal Navigation Channels, Les Cheneaux Islands, Mackinac County, Michigan. We are providing the following comments for your consideration:

Letter Report

We find that the subject letter report does not include adequate provisions to protect recreational interests. A proposal to develop the Cedarville Boat Mooring/Launching Facility with assistance from the Land and Water Conservation Fund was approved by the Lake Central Region, Bureau of Outdoor Recreation, on January 25, 1977 (Project 26-00815). It does not appear that the proposed use of the launching area as a land transfer site for bottom materials would be inconsistent with the designated use of the facility for recreation, given adequate provisions and protection under the proposed channel maintenance dredging project.

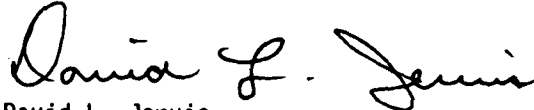
The draft statement indicates that the movement of scows from the channel to the boat launching area and the unloading of dredged bottom materials could be scheduled to take place during non-peak recreation periods (Section 4.24, page 31). We recommend that these operations be scheduled as mentioned above and provided for in the letter report. To further avoid or minimize conflict with recreation, we also recommend that the feasibility of conducting project-associated dredging during non-peak recreation periods be examined by the U.S. Army Corps of Engineers and coordinated with the Bureau of Outdoor Recreation. For example, it is possible that backlog dredging can be initiated at or near the end of the prime recreation season and completed prior to the formation of a restrictive ice cover. If feasible, the letter report should provide for project-associated dredging to take place outside the prime recreation season and the effects of the scheduling should be amplified in the final statement.

The letter report indicates that the dredging contractor will be responsible for repairing any damages to the boat launching facility that may be caused by dredging (page 6, last paragraph). We assume that the dredging contractor will also be responsible for damages that may occur during the transfer of bottom materials. This should be clarified in the letter report and mentioned in the final statement.

Draft Environmental Statement

The draft statement is generally adequate in its discussion of environmental resources within our area of jurisdiction and expertise, with exception to the issues raised in our comments on the letter report.

Sincerely yours,

A handwritten signature in cursive script, reading "David L. Jervis".

David L. Jervis
Regional Environmental Officer



U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

REGION 5

18209 DIXIE HIGHWAY

HOMewood ILLINOIS 60430

November 8, 1977

IN REPLY REFER TO

HED-05

U.S. Army Engineer District, Detroit
P. O. Box 1027
Detroit, Michigan 48231

ATTN: Chief, Environmental Resources Branch

Gentlemen:

The draft environmental statement for the confined disposal facility and maintenance dredging of the Federal navigation channels, Les Cheneaux Islands, Michigan, has been reviewed. We offer the following comments for your consideration in developing the final statement.

The statement indicates the dredged material will require truck hauling over the local road system through the village of Cedarville. The proposed action should be coordinated with the local road officials relative to the designation and use of the local road system for hauling, adequacy of the proposed haul routes to handle the anticipated loads, traffic control, signing, maintenance and rehabilitation of the haul roads used.

The Letter Report (page 9) indicates conventional dump trucks may not be suitable for hauling. If special hauling equipment is necessary, these requirements should also be developed in cooperation with the local road officials as they relate to the structural capacity and geometrics of the haul roads selected.

Sincerely yours,

Donald E. Trull
Regional Administrator

By: *W. G. Emrich*
FOR W. G. Emrich, Director
Office of Environment and Design



DEPARTMENT OF TRANSPORTATION
SAINT LAWRENCE SEAWAY DEVELOPMENT CORPORATION

WASHINGTON, D.C. 20590

MASSENA, NEW YORK 13662

November 16, 1977

Mr. P. McCallister
Chief, Engineering Division
Army Engineers, Detroit District
P. O. Box 1027
Detroit, Michigan 48231

Dear Mr. McCallister:

Reference is made to NCEED-ER 20 October 1977 transmittal of the Draft EIS's for maintenance dredging of the following harbors and waterways:

Les Cheneaux Islands, Michigan
St. Joseph Harbor, Michigan
Frankfort Harbor, Michigan
Port Austin Harbor, Michigan

SLSDC has reviewed the subject EIS's and has no comments to offer. Thank you for the opportunity to examine these documents.

Sincerely,

Clarke F. Dilks
Chief, Environmental Planning



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

11 JAN 1979

Mr. P. McCallister, Chief
Engineering Division
U.S. Army Engineer District, Detroit
Box 1027
Detroit, Michigan 48231

RE: 77-080-133
D-COE-F32057-MI

Dear Mr. McCallister:

We have completed our review of the Draft Environmental Impact Statement (EIS) for the proposed confined disposal facility and maintenance dredging of the Federal navigation channels of the Les Cheneaux Islands, Michigan. This review was originally requested by your agency on October 20, 1977. However, your letter of December 16, 1977, requested deferment of our official review pending evaluation of an alternative for restricted open water disposal. On December 21, 1978, Mr. Richard Gutleber orally asked Mr. Robert Kay of my staff at your office to provide comments on the original Draft EIS.

In general, we have no major objections to the proposed project. However, certain minor revisions and some additional information in the EIS are required.

Project Description

The first sentence in paragraph 1.02 gives one the impression that all sediments in the Les Cheneaux Island Channels are unsuitable for open lake disposal. The sentence should be revised to explain that sediments to be dredged from some reaches of the Les Cheneaux Island Channels were identified as unsuitable for unrestricted open lake disposal. Similar revisions are necessary in other paragraphs of the EIS.

According to paragraph 1.08, the 7 acre upland disposal area "...will be entirely sealed with an approximately 24" thick layer of clay to prevent potential contamination of groundwater supplies..." We agree that at least 2 feet of clay should be used to seal the sides and floor of the disposal area. The plates on pages 60 and 61 should be corrected to show 24" thick clay seal instead of a 12" thick clay seal. The location of the Clark Township Landfill as shown on Plate IA (page 55) should also be corrected.

Environmental Setting

The discussion in paragraph 2.20 refers basically to the conclusions of the 1973 bottom sediment survey. This discussion should also describe the conclusions of the 1976 survey and the guidelines used for the 1976 survey (these are included in the EIS on pages 1-20 and 1-21). The status of the Clark Township Harbor Improvement Project (paragraphs 2.32 and 2.37), and future plans of the "new dredged maneuvering area" should be disclosed. Reference is made in the EIS to a "new marina site on Meridian Road." The dependency of the marina site on the proposed project and the existence of any permits for marina construction should be discussed.

Probable Impact

The Draft EIS should more clearly identify the magnitude of increased truck traffic, and explain whether road spills or noise impacts to local residents would be significant enough to warrant the inclusion of specifications in any contract for construction and maintenance of the proposed project.

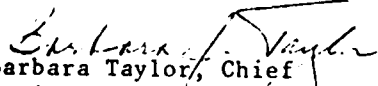
The number and general distance of local residences having wells along Meridian Road or State Avenue Road from the proposed disposal area should be noted. The likelihood of seepage through the clay liner of the disposal area and local wells being contaminated from this seepage should be discussed. Consideration should be given to the depth of the wells, their location, their groundwater flow, and local cones of depression from well pumping requirements. To assure satisfactory protection of local wells, and possible contamination resulting from the construction and operation of the proposed disposal area, a monitoring program should be established to periodically check for the occurrence of adverse surface or subsurface water quality changes in the vicinity of the disposal area. Residents in the near vicinity of the disposal area should also be encouraged to have their well water periodically tested by the County or State Department of Public Health for potability. It is important that overflow from the disposal area not cause water quality standards to be violated in any receiving waters.

Alternatives

According to Public Notice NCEED-T for the Diked Disposal Area, Les Cheneaux Island Channels, Michigan, dated September 6, 1978, the method of upland disposal was concluded to "...be less expensive..." than restricted open water disposal and that "...the greatest public interest would be derived by utilizing the material as cover for the township dump." Paragraph 6.04 of the EIS should be revised to reflect the conclusion expressed in the Public Notice.

In accordance with our Agency's directives, we have classified the project as LO (lack of objection) and the EIS as 2 (additional information required.) The date and classification of our comments will be published in the Federal Register. Should you have any questions regarding the comments above, please contact Mr. Robert Kay at 312-353-2307.

Sincerely yours,


Barbara Taylor, Chief
Environmental Impact Review Staff
Office of Federal Activities

MICHIGAN DEPARTMENT OF STATE
RICHARD H. AUSTIN SECRETARY OF STATE



LANSING
MICHIGAN 48918

October 25, 1977

MICHIGAN HISTORY DIVI
ADMINISTRATION, ARCHIVES,
HISTORIC SITES, AND PUBLIC
3423 N. Logan Street
817-373-0810
STATE MUSEUM
606 N. Washington Avenue
817-373-0816

District Engineer
U.S. Army Corps of Engineers, Detroit District
P.O. Box 1027
Detroit, Michigan 48231
Attn: Environmental Resources Branch

Dear Sir:

Our staff has reviewed the following project and concludes that it will have no effect on cultural resources.

Confined Disposal Facility/Maintenance Dredging of the Federal
Navigation Channels, Les Cheneaux Islands

If you have further questions, please contact Dr. Lawrence Finfer, Environmental Review Coordinator for the Michigan History Division. Thank you for giving us the opportunity to comment.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Martha M. Bigelow".

Martha M. Bigelow
Director, Michigan History Division
and
State Historic Preservation Officer

MMB/LF/cw

HIGHWAY COMMISSION
PETER B. FLETCHER
CHAIRMAN
Ypsilanti
CARL V. PELLONPAA
VICE CHAIRMAN
Ishpeming
HANNES MEYERS, JR.
COMMISSIONER
Zeeland
WESTON E. VIVIAN
COMMISSIONER
Ann Arbor

STATE OF MICHIGAN



WILLIAM G. MILLIKEN, GOVERNOR

DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

STATE HIGHWAYS BUILDING, 425 WEST OTTAWA PHONE 517-373-2080
POST OFFICE DRAWER K, LANSING, MICHIGAN 48904

JOHN P. WOODFORD, DIRECTOR

November 14, 1977

Mr. P. McCallister, Chief
Engineering Division
U. S. Army Engineer District, Detroit
P. O. Box 1027
Detroit, Michigan 48231

Dear Mr. McCallister:

The Environmental Liaison Section (ELS) has reviewed the Draft Environmental Impact Statement (DEIS) for the Confined Disposal Facility and Maintenance Dredging of the Federal Navigation Channels at Les Cheneaux Islands, Michigan.

We concur with the DEIS's contention that the Cedarville Township dump represents the site location alternative that will result in the least adverse environmental impacts. However, we do not believe the DEIS adequately addresses the impact of the project. Therefore, we suggest attention be given to the following items in the Final Environmental Impact Statement (FEIS):

1. The DEIS recognizes the high potential for pollution of project area groundwater supplies. The DEIS also states on page 4 that "Should the dredged material be unduly wet or sloppy, specially lined, gasketed, or otherwise, compartmented trucks may be required to prevent spillage of the polluted material along the haul route." It is the suggestion of the ELS that given the recognized potential for groundwater pollution that the FEIS indicate use of covered, water tight dump trucks will be made a hauling contract requirement.
2. The DEIS states that "Sealing of presently unconfined refuse at the Clark Township dump site and diversion of surface water from other parts of the dump site would result in improved groundwater quality." However, it does not indicate whether the existing unconfined refuse will be removed prior to placement of the clay seal, or whether the seal will be placed over the refuse.



Mr. P. McCallister
November 14, 1977
Page 2

The ELS suggests the FEIS require either the refuse be removed prior to placement of the clay seal, or that the dikes be extended below ground level to an elevation below that of the refuse. Use of one or both of these procedures would aid in preventing possible contamination of groundwater through horizontal movement of the same.

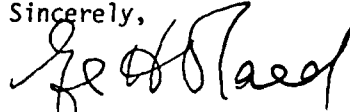
The FEIS should also call for the drilling of wells in both bedrock and glacial drift to the north and south of the site to allow for monitoring of the disposal site's affect on groundwater quality.

3. The DEIS states that the Cedarville Marina boat launching site will be used for the transfer of dredge material from scow to dump trucks. As this procedure could adversely affect use of the ramp by recreational boaters or facilities constructed with monies from the Land and Water Conservation Fund Act of 1965, the results of prior coordination with the Bureau of Outdoor Recreation should be shown in the FEIS.
4. Although the DEIS discusses the impact of the project on endangered and threatened species, it does not show the results of prior coordination with the U.S. Fish and Wildlife Service and Michigan Department of Natural Resources, as required by Section 7 of the Endangered Species Act of 1973. The results of such coordination should be included in the FEIS.
5. It is our suggestion that the FEIS discuss the feasibility of using the material dredged from unpolluted areas for beach nourishment or road construction, as confined disposal of unpolluted material constitutes a waste of a valuable natural resource.
6. It is apparent that transfer of material from the marina to the disposal-site will involve having heavy trucks crossing M-134. It is, therefore, our position that the Department's District Traffic Engineer in Newberry, Paul Michelin, be contacted to see if the location and

Mr. P. McCallister
November 14, 1977
Page 3

number of anticipated crossings warrant the replacement
of truck crossing signs.

Sincerely,

A handwritten signature in dark ink, appearing to read "Jan M. Raad". The signature is fluid and cursive, with the first name "Jan" being more prominent.

Jan M. Raad, Manager
Environmental Liaison Section
Environmental and Community
Factors Division

STATE OF MICHIGAN



NATURAL RESOURCES COMMISSION

CARL T. JOHNSON
E. M. LAITALA
DEAN PRIDGEON
HILARY F. SNELL
HARRY H. WHITELEY
JOAN L. WOLFE
CHARLES G. YOUNGLOVE

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING, BOX 30028, LANSING, MICHIGAN 48909
HOWARD A. TANNER, Director

December 29, 1978

Mr. Richard Gutleber
Detroit Army Corps of Engineers
P. O. Box 1027
Detroit, Michigan 48231

Dear Mr. Gutleber:

The following comments regarding the Les Cheneaux Islands dredging and disposal facility Environmental Statement draft are being forwarded to you as requested. Our concerns center primarily on open water disposal, timing of dredging activities and enlargement of the launch site for off loading of dredge spoils.

The draft indicates a possibility of some open water disposal of unpolluted materials. However, your telephone conversation with Dr. Tierney on December 27, 1978, suggested that all materials may be contained in the upland fill site. If any open water disposal is considered, it should be south of a line running from the north point of Tobin Reef to the south end of Goose Island. This will prevent inundation of sensitive spawning areas.

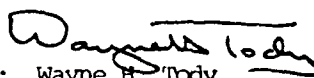
The timing of dredging activities is crucial to protect both birds nesting on adjacent shorelines and spawning fish. Because at least one threatened and several rare bird species nest in the area, dredging during nesting activities is not recommended. In order to avoid spawning and nesting periods, yearly dredging should be postponed until July.

The extension of the launch site for off loading of dredge spoils by 25 to 30 feet seems excessive. It is hoped that as much bottomland as possible will be saved from filling by reducing this extension.

Beyond the points mentioned above, this Department sees no major problems inherent in this project.

Sincerely,

Howard A. Tanner
Director


By: Wayne H. Tody
Deputy Director



R1028 10/78

APPENDIX 6

ECONOMIC DATA

ECONOMIC DATA, EXTRACTED FROM
U.S. ARMY CORPS OF ENGINEERS
DESIGN ANALYSIS
Les Cheneaux Island Channels, Michigan
January, 1979

<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Estimated Amount</u>
Clearing & Grubbing	7	Acres	\$ 3,500	\$24,500
Earth Dike Materials	7,755	cy	10.00	77,550
Clay Seal	1	Acres	32,000	32,000
Outlet Structure	1	Ea.	10,000	10,000
Seeding	8.5	Acres	850	7,225
SSP Cells	7,560	sf	12.00	90,720
Oak Rub Strip	130	lf	50.0	6,500
Access Dredging & Disposal	8,800	cy	8.0	70,400
Sand Back Fill	1,100	cy	8.00	8,800
Stone Core	1,500	cy	13.00	19,500
Gravel	120	cy	8.50	1,020
Restoration	3	Site	3,500	10,500

Subtotal	358,715
Contingency (15%)	53,807
Subtotal	412,522
Engineering & Design	225,000
Supervision & Admin (8.0%)	33,000

Total Project Cost 670,500

Annual Cost For The
Confined Disposal Facility

Total Project Cost	\$670,500
Annual Charges	
Interest @ 0.06875	46,096
Amortization for 10 yrs. @ 0.07281	48,819
Operation & Maintenance	6,000
Annual Charges:	\$100,915

Cost per cubic yard $\$100,915 \div 11,000 = \$9.17/\text{cy}$ of Dredgings

ESTIMATE OF COST
DEEP WATER DISPOSAL
LES CHENEaux DIKED DISPOSAL

Dredge & Transport Material 110,000 cy @ \$10.00/cy (14 mile round trip)	=	\$1,100,000
Cover Material 123,000 cy @ 10.00/cy	=	\$1,230,000
Protective Coverstone 130,000 T @ \$13.75	=	<u>\$1,787,500</u>
Subtotal		\$4,117,500
Contingencies		<u>617,500</u>
Subtotal		\$4,735,000
E&D		150,000
S&A		<u>284,000</u>
Total		\$5,169,000
Cost/cy		\$ 46.99
Upland Disposal (Letter Report)		\$ 20.10

APPENDIX 7

STATE OF MICHIGAN'S

WATER QUALITY CERTIFICATION

STATE OF MICHIGAN



NATURAL RESOURCES COMMISSION

CARL T. JOHNSON
E. M. LAITALA
DEAN PROGEON
MILARY F. SNELL
HARRY H. WHITELEY
JOAN L. WOLFE
CHARLES G. YOUNGLOVE

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING, BOX 30028, LANSING, MICHIGAN 48909
HOWARD A. TANNER, Director

March 27, 1979

Mr. Phillip McCallister, Chief
Engineering Division
U.S. Corps of Engineers
P.O. Box 1027
Detroit, MI 48231

Re: Maintenance and Dredging Projects

Les ~~Channel~~ *Cheneaux*
Grand Haven Harbor
Port Sanilac Harbor
Holland Harbor
Monroe Harbor
Muskegon Harbor
Ludington Harbor
Detroit River
New Buffalo Harbor
Saginaw River
Ontonagon Harbor
✓ Rouge River
St. Clair River
Keewenaw Waterway
Lake St. Clair
Clinton River
Lac La Belle
Harrisville Harbor

Dear Mr. McCallister:

The above projects have been reviewed by the Michigan Department of Natural Resources Corps Project Review Committee. These projects require maintenance dredging for removal of shoal material which have accumulated in navigational channels and harbors.

These projects may cause localized turbidity to the water in the immediate and adjacent work area for a short period of time during the dredging operations. The dredge contractors should exercise caution and require procedures to hold such conditions to an absolute minimum.

Those shoal materials classified as polluted by the U.S. EPA criteria shall be disposed of upland in accordance with procedures outlined for individual projects and in a manner which will not create environmental problems.



R1028 10/78

Mr. Phillip McCallister

-2-

March 27, 1979

On recommendations of the Corps Project Review Committee, the State of Michigan certifies under Section 401(a) of the Federal Water Pollution Control Act, as amended, PL 95-217, that the above projects will comply with the State's Water Quality Standards. Additionally, this document shall serve as the State of Michigan concurrence for the work and fulfill the requirements of Section 404 (t) of the Federal Act.

Sincerely,

WATER QUALITY DIVISION



Robert J. Courchaine
Division Chief

RJC/JB/ej

cc: L. Witte, Chairman Corps Project Committee
Committee Members

LMED
2-8